Public Health Reports

LUME 59 JANUARY 7, 1944 NUMBER 1

IN THIS ISSUE

Public Water Supply Needs in States

CONTENTS

Public Health Reports

Vol. 59 • JANUARY 7, 1944 • *No. 1*

NATIONAL INVENTORY OF NEEDS FOR SANITATION FACILITIES

I. PUBLIC WATER SUPPLY

By H. W. Streeter, *Sanitary Engineer Director*[1] and Ray Raneri, *Passed Assistant Engineer*[2] *United States Public Health Service*

INTRODUCTION

Of the various public utilities which modern community life requires, none is more important or indeed more essential to the continued prosperity and health of the community than an adequate supply of good water. This truism has been so widely and, on occasion, so forcibly demonstrated that few if any well-informed persons would dispute it.

The dependence of public health on a good water supply goes far beyond the mere requirement that such a supply be free from the possibility of transmitting water-borne disease. If the public health of a community be viewed in its broader modern sense as being concerned not only with the negative question of preventing disease but also with the more positive one of promoting good health among all citizens, the wider implications of a good water supply are evident.

In this connection it is only necessary to point out a few instances familiar to everyone. Among these are the protection of life and property against fire and the proper sanitation of the community, such as street cleaning and the rapid and effective disposal of sewage and other water-carried wastes. These services are dependent on an ample quantity of water from a public supply, but its quality and palatability are also involved very directly in such matters as the consumption of physiologically adequate quantities of water by individuals, the economical use of water for laundry and other household cleaning purposes, and the avoidance of unsafe local sources of water supply for drinking purposes whenever the public supply is objectionable in taste or appearance or unsuitable for culinary purposes. All of these phases of the use of water have an important bearing on public health, quite aside from the paramount requirement of its safety for human consumption.

[1] In charge of the Office of Stream Pollution Investigations, Cincinnati, Ohio.
[2] Head of Information and Survey Unit, Sanitation Section.

In undertaking the present study of public water supply needs in the various States, the problem has been viewed from this broader angle of providing not only for the elimination of water-borne disease but also of insuring to every community a public water supply meeting the two basic requirements of ample quantity and satisfactory quality for all of the ordinary water uses of a community. The inventory has considered in detail every phase of such requirements with two exceptions, namely, (1) the freedom of water supplies from excessive hardness, which is to a large extent an economic problem, and (2) freedom from iron and manganese. In a section of this paper, the particular question of hardness and its economic cost will be discussed, however, in its relation to the general problem of public water supplies in certain areas of the country where hard waters are common.

Before taking up the inventory proper, it will be desirable to sketch very briefly the present status of public water supplies in the United States, to indicate broadly the general requirements for satisfactory supplies, and to point out some of the more important economic losses involved in failure to meet these requirements, together with the economic benefits resulting from correction of such deficiencies.

Present status of public water supplies in the United States—In the United States, public water supplies date historically from the year 1652, when the first system of this kind was instituted at Boston. At the end of the year 1800, some 150 years later, 17 waterworks systems existed in this country. Fifty more years passed before these systems numbered 100, but in 1900 they had increased to about 3,200 and in 1924 to 9,000 (*1*). In 1940 they approximated 14,500 and at the present time are estimated to serve about 84,500,000 people, or slightly less than two-thirds the total population of the entire country. The phenomenal development of public water supplies in the United States within the past 50 years, amounting to nearly a fivefold multiplication in their total number, probably is without parallel in waterworks history.

A recent census of water treatment facilities in the United States, conducted by the Public Health Service (*2*), together with supplementary data on untreated supplies, has shown that the greatest deficiency in public water supplies exists in the smaller communities having populations under 1,000, as indicated by the following comparison between the total numbers of incorporated places, divided into three groups according to their populations, and the numbers of these communities served by public water systems:

Population	*Total number of incorporated places—1940 Census*	*Number of incorporated places with public water supplies*
5,000 and over	2,042	
1,000 to 4,999	4,627	
Under 1,000	10,083	

From this tabulation it appears that over 99 percent of the communities in the largest population group, 5,000 and over, are served by public water systems and about 93 percent in the middle group, but only 43 percent in the lowest group of less than 1,000 population. The census also has disclosed that approximately 10 million people, comprising about 11 percent of the total population served by public water supplies, are supplied with water receiving no treatment.

According to the data collected from the Public Health Service's water purification census up to the end of the year 1941, approximately 75,100,000 people, or 89 percent of the total population served by water supply systems, are furnished with treated water from some 5,535 treatment plants. The classification of treatment furnished, based on data for all of the 48 States combined, was as follows at the end of the year 1941:

Treatment	*Percent of total by—* Number of plants	*Percent of total by—* Population served
Rapid-sand filter purification	(30. 8)	(44. 2)
Purification only	28. 8	37. 4
With softening	2. 9	6. 2
With iron and manganese removal	0. 1	0. 3
Slow-sand filter purification	1. 8	5. 8
Iron and manganese removal	8. 7	3. 5
Softening only	5. 0	1. 9
Simple chlorination and miscellaneous chlorination	47. 0	43. 3
Iron and manganese removal, with softening	2. 7	0. 7
Miscellaneous (without chlorination)	2. 8	0. 7

Although simple chlorination, serving about 32,400,000 people through 2,592 plants, is the process most frequently used, rapid-sand filter purification, with 1,754 plants, serves a slightly greater population (about 33,000,000). Water softening either alone or in combination with other treatment serves about 6,700,000 people through 587 plants, of which 426 plants use softening alone or in combination with iron removal. Slow-sand filter purification serves about 4,300,000 people through 98 plants.

During the few years preceding the entry of the United States into the present war, the construction of new water systems and the improvement of old ones proceeded very actively under the stimulus of Federal aid projects of the Public Works Administration and the Work Projects Administration. With our entry into the war, this work was suspended, except for water supplies urgently needed at military posts and training camps and, in some cases, in vital war-industrial areas where sudden and large increases in population have overtaxed existing facilities. At the present time, established waterworks systems are being maintained with the barest minimum of repairs and replacements, owing to scarcity of metals and other critical materials needed in war production.

This situation, which of necessity will continue throughout the remainder of the war, will mean a progressive retrogression in the existing water supply facilities of the country which, together with the suspension of ordinary extensions to meet normal population growth, will create a cumulative deficiency to be made up after the war.[3] An added stimulus to post-war rehabilitation and improvement of public water supplies will be the increasingly widespread demand for new supplies by many communities, especially the smaller ones which now lack such facilities, and also a tendency toward more exacting standards of quality for all water supplies, which will tend to create a general demand for improvements and additions in water treatment.

In some sections of the country, notably in the more densely populated areas of the Eastern and Middle Western States, the general problem of maintaining good public water supplies is complicated by two major developments which have presented a situation of increasing difficulty in recent years. These are: (1) a progressive depletion of ground water supplies as the result of overdrafts in underground reserves, and (2) a marked increase in pollution of surface sources of water by sewage and industrial wastes. The first-named tendency, which attained somewhat alarming proportions during the drought years of the 1930's, has necessitated in some cases the augmentation of ground supplies by those obtained from surface sources. This tendency will increase, if further depletion of underground water strata occurs. During the decade 1930-40, excessive pollution of surface sources of water supply resulted in the development of new sources at Toledo, Grand Rapids, Albany, Youngstown, Springfield (Ill.), Sandusky (Ohio), and Little Rock (*3*). These improvements cost altogether more than $20,000,000. In numerous other instances, raw water pollution has necessitated extension and elaboration of existing water-purification facilities, often at great expense. In general, water problems of this type are intimately related to those of waterways pollution and the ultimate solution of these two general problems will be likewise closely interdependent.

General requirements of a good water supply.—In general, a satisfactory public water supply should be adequate in quantity and pressure to meet all domestic, industrial, and fire-protection needs of a community. It should be hygienically safe at all times for drinking and culinary purposes, should not contain excessive turbidity, color, hardness, or iron, and should be free from undesirable tastes and odors. It also should contain no toxic metals or other like substances such as lead or arsenic and should be free of certain materials such as phenols or cresols, which may cause objectionable tastes in treated water supplies. It should be relatively noncorrosive and should be suffi-

[3] According to a recent estimate by Wolman, the expenditure of about 20 million dollars per year will be required immediately after the war to make up this deficiency.

ciently in equilibrium chemically so that no cumulative deposits of mineral salts will occur in piping and hot-water systems.

The amounts of water consumed in cities of the United States average about 120 gallons per capita daily,[4] with ranges of 80 to over 300 gallons in individual cities. Surveys have indicated that average rates of domestic consumption of water range from 30 to 50 gallons or more per capita, with 30 gallons as the estimated minimum. For ordinary residential districts, pressures of 25 to 40 pounds per square inch are required, though present practice favors carrying 60 to 75 pounds in order to provide adequate pressure for fire protection and to allow a large margin of fluctuation in local pressures in meeting sudden drafts. For fire protection, available flows ranging up to 12,000 gallons per minute are required, with an additional allowance of 2,000 to 8,000 gallons per minute for a second fire. In the Chicago stockyards fire of 1935, the rate of draft exceeded 50,000 gallons per minute. In general, the ordinary maximum daily consumption may exceed the yearly average by about 50 percent and the maximum hourly consumption may exceed the daily rate by 50 percent. In designing water systems, pumping, treatment, and distribution capacities are figured as high as 2.0 or 2.5 times the average rate of consumption, in order to allow for ordinary maximum rates of draft in addition to overdraft for fire protection.

Desirable quality requirements for public water supplies have been set forth in the Drinking Water Standards of the Public Health Service, of which the latest revision was issued September 25, 1942 (*4*). Although these Standards are intended to be applicable only for drinking and culinary waters supplied by common carriers in interstate commerce, they have been followed in a majority of the States as a criterion of quality for public water supplies in general. The Standards limit the number of coliform bacteria in a water to an average not exceeding 1 per 100 milliliters, these bacteria being indicative of undesirable pollution when present in higher concentrations. Additional requirements fix upper limits for turbidity and color of a water, and its content of lead, arsenic, and other undesirable metallic pollutants. No objectionable taste or odor is permissible. Although no limit is set for the total hardness, certain limiting requirements are suggested with respect to the total alkalinity at various hydrogen ion concentrations (pH). Appended to the Standards is a "Manual of Recommended Water Sanitation Practice," in which various sanitary defects in water supplies are described, together with suggested measures whereby such defects may be prevented or eliminated.

---

[4] The recent Public Health Service census has indicated an average of 110 gallons in 29 States for which the best data are available.

Economic losses from deficiencies in water quality.—The costs of sanitary and other defects in the quality of water supplies have been studied by several observers, dating from the original work of the late George C. Whipple (*5*) about 35 years ago. Several estimates have been made of the economic losses due to deaths from preventable water-borne diseases such as typhoid fever and dysentery. On the basis of damage awards resulting from an outbreak of water-borne typhoid fever at Olean, N. Y., in the year 1928 Shaw and Chase (*6*) have estimated that each death from typhoid fever costs the community about $20,000; hence each death prevented may be considered as saving an equivalent sum. On the assumption that one-half of the reduction in deaths from typhoid fever recorded between 1900 and 1935 was attributable to increased safety of water supplies, the authors conclude that this saving due to pure water has amounted to the total sum of $400,000,000 annually in the United States.

On the same basis it may be estimated that the economic loss from deaths due to typhoid fever approximated $68,400,000 in 1935, when the death rate for the entire registration area was 2.8 per 100,000, and $21,200,000 in 1940, when the death rate reached the phenomenally low point of 0.8 per 100,000. If one-half the typhoid fever in 1940 was water-borne, the economic loss in this year due to deaths from this disease was roughly $10,000,000.

The same authors have considered the economic losses due to excessive amounts of turbidity, color, iron and manganese, and to undesirable tastes and odors in public water supplies. They have based their estimates in part on the recorded per capita expenditures for bottled spring waters not having these defects. Their conclusions on these points are that the annual losses due to these types of water quality impairment are very roughly as follows:

	Per million gallons daily of water consumption	*Per thousand of population annually*[1]
For turbidity exceeding 10 p. p m	$400 per p. p. m.	$48 per p. p. m.
For color exceeding 5 p. p. m	200 per p p. m.	24 per p. p. m.
For iron and manganese	1,000 per p. p. m.	120 per p. p. m.
For tastes and odors	$2,000 to $20,000 per year	$240 to $2,400

In a city of 100,000 population, a water containing 3 p. p. m. of iron would impose, on this basis, an economic loss amounting to $36,000 annually. At the minimum figure given for tastes and odors, the total cost of this impairment in the same city would be estimated at $200,000 annually. Both of these deficiencies in the quality of public water supplies have a definite public health significance because water consumers served with an iron-bearing or taste-producing water supply will tend to avoid such a supply in favor of other local sources which may be and frequently are hygienically unsafe.

[1] Assuming an average water consumption of 120 gallons per capita daily

The annual losses due to corrosive water vary widely with local conditions, as would be expected, but are always a definite item of cost in terms of shortened life of services and inside piping in homes, office buildings, and factories. In one case cited by Shaw and Chase, the loss due to corrosion was estimated at $36,500 annually per million gallons daily of water consumption. As pipe corrosion is a relative action, nearly always prevalent to some degree wherever water comes in contact with a corrodible metal, no generalized estimate can be made as to the total damage done by this agent, though it probably is very large and exacts a heavy annual toll in all waterworks systems.

Excessive hardness in a water supply, in addition to causing extra soap consumption, exacts a toll of shortened life for washable fabrics and cooking utensils, increased expense of maintaining plumbing, water tanks, and heaters, fuel losses in heating water in homes and factories because of scale formation, and the added costs of household water softeners and industrial boiler compounds.

Recent data have indicated that the combined annual cost of hard water averages from 1.0 to 1.5 cents per capita for each part per million of hardness in excess of 75 to 100 p. p. m. Shaw and Chase estimated that the annual losses at Dayton, Ohio, using a water of 350 p. p. m. hardness, were $3.50 per capita, as compared with the cost of using a softened water at 100 p. p. m. Estimates for 232 Kansas municipalities using water averaging 334 p. p. m. hardness have indicated an annual loss of 25 pounds of soap per capita. At 16 cents per pound, this represents a loss of $4 per capita per year.

An approximate estimate of the total economic loss due to use of hard water in over 600 cities surveyed by Collins in 1932, as analyzed by Olson in a recent paper (7), has indicated an annual cost of about $24,000,000, or roughly 90 cents per capita, for some 27,000,000 people using waters exceeding 90 p. p. m. hardness.

In addition to the cost of other deficiencies in the equality of our water supplies, it may be estimated very roughly that excessive hardness and water-borne disease probably exact an economic loss amounting to at least $35,000,000 annually, to which roughly $5,000,000 might be added for losses due to nonfatal illness from water-borne disease, including both typhoid fever and diarrhea-enteritis. The losses represented by other defects in the quality of water supplies, though of such a nature as to be highly variable and thus indeterminable, probably would amount to at least $10,000,000 annually and doubtless would exceed this sum by a considerable margin if they could be fully and accurately appraised. This would not include the economic losses due to pipe corrosion which, if known, would undoubtedly be represented by a far greater annual expense over the entire country than the figures above given would indicate.

Although it would be hazardous to fix a definite figure for the total economic loss now resulting from sanitary and other defects in the quality of public water supplies in the United States, it would seem fairly safe to say, from the evidence available, that such a figure would be not less than $50,000,000 annually and might be somewhat higher if more definite information were available concerning the total cost of such items as unpalatability, excessive turbidity and color, iron and manganese, and corrosiveness in water supplies. Added to this would be a certain, though intangible, economic loss to the country resulting from the absence of public water supplies in the 6,087 incorporated communities having populations less than 5,000. It is in these communities that Wolman and Gorman (*8*) have noted the greatest occurrence of typhoid fever, the number of outbreaks in such communities having been 72 percent of the total during the period 1930–36. The needs of this large number of small communities for public water supply systems constitute probably the most important problem remaining to be solved in this particular category of community sanitation.

THE PRESENT INVENTORY

The present inventory was undertaken in March 1943 in connection with a general survey of sanitation needs instituted by the States Relations Division of the Public Health Service through its Sanitation Section.

Basic data for the inventory have been obtained from seven main sources, as follows:

1. United States census data for 1940, listing incorporated communities and their populations.
2. A national census of water treatment plants in the United States, up to the end of the year 1940, as compiled by the United States Public Health Service, with cooperation by State departments of health. Published in summary form in Public Health Reports, vol. 57, No. 45, Nov. 6, 1942, pp. 1679–1694, together with unpublished supplements for 1941 and 1942.
3. Reports of the National Resources Planning Board, dealing with water supply projects.
4. Reports of Lanham Act projects, as submitted for review by the Public Health Service.
5. Reports of reconnaissance surveys by the Public Health Service.
6. Public Works Administration waterworks non-Federal projects. Publication No. 101, Public Works Administration.
7. Engineering estimates for post-war construction from State and local agencies.

The inventory, which is based on a listing of individual com-

munities in each State, includes all known improvements and extensions of existing waterworks, except water softening and iron removal installations, required to furnish adequate service as an extension of existing treatment facilities. Included also in the listing are new public water supply systems needed for all incorporated communities with populations exceeding 200, excepting the construction of new water softening and iron removal plants. The works included in the extensions would provide the convenience of a public water supply system to as much of the entire population as is deemed economically feasible and would reduce the hazards to public health associated with inadequate public systems or the use of unprotected local sources of water.

The waterworks projects listed would include, in addition to improvements and extensions of supply and purification facilities, the extension of water distribution systems and feeder mains and provision for complete new water systems, including facilities for supply, purification, and distribution. In many communities, both large and small, existing water systems are in need of extensions and improvements. These needs are caused by normal population growth, obsolescence and depreciation of existing facilities, increase in pollution of sources of water supply, and other similar elements. The need for improvements of this type is of greater than normal magnitude because of necessary curtailment of ordinary waterworks construction during the present war period.

The tendency of large communities to expand peripheral suburban areas creates a general need for water distribution extensions and increase in feeder main capacity in order to provide adequate service in outlying districts. Many smaller communities containing closely developed areas are in need of public water supply systems because of the hazards associated with unsupervised private water development. In some cases water supplies for neighboring groups of smaller communities can be developed on a water district plan, thus economizing on the provision of these facilities.

In table 1 are listed the numbers of incorporated communities in each State, together with the numbers of these communities served by public water supplies according to three population groups. In the last column of the table is given the total number of incorporated communities served by public water supplies in each State. This table shows a total number of 16,752 incorporated communities in the 48 States, of which 10,656 are provided with public water supplies. Some 2,033 communities of 5,000 population and over are listed as having public water systems. Reference to a previous tabulation (page 2) will show a comparison of the total number of communities in each population group and the number provided with public water systems.

TABLE 1.—*Incorporated communities served by public water supplies*

State	Number of incorporated communities	Served by public water supplies: Population under 1,000	Population 1,000–4,999	Population 5,000 and over	Total
Alabama	279	56	86	30	172
Arizona	34	3	13	10	26
Arkansas	414	64	87	22	173
California	286	35	138	110	283
Colorado	250	122	52	17	191
Connecticut	43	1	10	24	35
Delaware	52	11	16	2	29
Florida	278	73	88	35	196
Georgia	590	116	129	38	283
Idaho	151	35	39	11	85
Illinois	1,140	240	291	122	653
Indiana	529	135	29	68	232
Iowa	931	357	171	44	572
Kansas	589	221	107	32	360
Kentucky	323	69	105	29	203
Louisiana	210	40	76	28	144
Maine	26	----	6	20	26
Maryland	145	48	34	12	94
Massachusetts	122	----	9	113	122
Michigan	475	108	162	78	348
Minnesota	745	220	149	44	413
Mississippi	295	84	83	23	190
Missouri	793	75	139	47	261
Montana	115	52	35	12	99
Nebraska	531	305	88	17	410
Nevada	12	2	6	3	11
New Hampshire	18	----	2	16	18
New Jersey	344	65	127	122	314
New Mexico	63	16	21	14	51
New York	611	207	228	120	555
North Carolina	488	83	119	45	247
North Dakota	333	49	37	10	96
Ohio	873	170	243	115	528
Oklahoma	520	42	115	43	200
Oregon	207	112	50	16	178
Pennsylvania	989	127	308	205	640
Rhode Island	19	----	1	18	19
South Carolina	248	29	70	24	123
South Dakota	303	132	46	10	188
Tennessee	221	68	67	27	162
Texas	645	202	276	102	580
Utah	192	108	55	8	171
Vermont	75	14	22	10	46
Virginia	218	76	64	29	169
Washington	222	116	61	22	199
West Virginia	209	58	84	26	168
Wisconsin	512	142	132	54	328
Wyoming	89	35	24	6	65
Total	16,752	4,323	4,300	2,033	10,656

Method of compiling the inventory.—The preliminary listing of incorporated communities over 200 in population was obtained from the 1940 United States Census, together with their 1940 populations. These communities are listed by States. From the detailed information of the Public Health Service water purification census an estimate was made of the needed extensions of systems providing water

treatment, in accordance with the difference shown between the total census population of each community and the population served by the present system. In this manner ratios were obtained of the total census population to population served which could be applied to estimating the necessary extension of distribution systems both on treated supplies and on untreated supplies, the latter listings being obtained from other sources. In estimating the needs, if the existing treatment capacity was shown to be more than 1.5 times the average water consumption, the capacity of the treatment system was considered as adequate; if otherwise, an increase in capacity to 2.5 times the present average consumption rate was considered necessary. This procedure was in accordance with usual practice in estimating needed extensions of water-treatment systems for future periods.

The data concerning needs for extensions of untreated water supplies not included in the Public Health Service treatment census were obtained from reports of the National Resources Planning Board, together with the other sources of information above noted From the National Resources reports only projects not yet constructed were listed. From reports of the Lanham Act projects and the United States Public Health Service reconnaissance surveys were taken listed projects which had not been included in other sources of information. Estimates of requirements for new systems were obtained by comparison of lists of existing water supplies with lists of incorporated communities in each State as shown by the 1940 Census. In this connection, reference also was made to proposed projects listed in various issues of the engineering periodicals.

In order to establish a background for estimating the cost of future projects, a study was made of the per capita costs of waterworks projects as reported by the Public Works Administration in publication No. 101. This publication shows the location, description, and final cost of waterworks constructed by the Public Works Administration during the period July 1933 to March 1939. The following types of projects were considered separately from the report:

(1) New waterworks systems
(2) New purification works
(3) New sources and purification works combined
(4) New ground-water supplies

In these groups all projects containing extensions, renewals, and additions to present systems were excluded in order to show the true picture of the cost of completed new construction. New waterworks system costs include those of developing new sources (in most cases wells), construction of pumping stations, including buildings, and the construction of distribution systems. New purification works include sedimentation tanks, coagulation basins, rapid- or slow-sand filtration, pumping equipment, structure of housing and

pumping equipment, and the necessary main extensions to connect the purification plant with the distribution system.

The third group, new sources and purification works, includes, in addition to treatment plants, new sources of supply which may have been from either a surface or a ground-water source.

The fourth group consists of projects in which new ground-water sources were developed, including pumps, structures to house the pumps, and main extensions to connect the source of supply with the distribution system.

In order to analyze the data thus grouped, the projects were listed individually, the construction costs per capita computed, and these costs then averaged for the various population ranges. The average per capita costs thus obtained were then plotted against average populations for the several groups.

The base data for these plots are given in table 2, divided into four sections according to the subdivision above indicated.

TABLE 2.—*Relation between average size of population group and corresponding cost of newly constructed water supply facilities*

[Based on Public Works Administration contracts, 1933-39]

	Population range	Number of projects	Average population	Average cost per capita
Waterworks systems (complete, including source)	100-500	246	370	$84 00
	500 1,000	340	700	65 60
	1,000-10 000	195	1,800	45 00
Treatment works	100-500	2	384	23 20
	500-2,000	11	1,130	19 80
	2,000-10,000	23	4,320	15 00
	Over 10,000	8	39,800	9 20
Sources and treatment works combined	500-2,000	4	1,350	28 40
	2,000 10 000	9	5 320	18 40
	Over 10,000	6	120,000	15 50
Ground water supplies	100-500	4	430	16 20
	500-2,000	12	1,230	7 30
	2,000-10,000	5	3 050	5 28

In general, it is noted that the per capita costs of construction for new water supply facilities of all types tend to bear an inverse relation to the size of the population group served, that is, to diminish with increasing population.

Altogether 865 Public Works Administration projects were listed in the four categories—44 in treatment, 19 in source and treatment, 781 in completely new systems, and 21 in ground water supplies.

Construction costs have continued to rise from 1915 up to the present time, except for minor declines during short intervals. Following the last war, construction costs varied considerably but during the period 1920-30 averaged about 12 percent higher than those prevailing during the war. Construction costs at the present time are about 32 percent higher than in the period 1934-40. Following

the present war, insofar as experience of the last war is a guide, it is reasonable to expect further increase in costs above the present level.

Assuming this increase to be of about the same magnitude as it was after the last war, the inference would be that construction costs after the present war would be about 48 percent higher than in the period 1934–40. Costs prevailing at this high level may have the effect of impeding many worth while public works, though indications are that some sort of price control will be maintained after the war to hold approximately to present costs. Any increase in construction costs above the present level will have the effect of increases in the estimates here shown. For this reason the total estimated costs for new waterworks construction based on per capita costs indicated in table 2 for the period 1933–39 were increased 32 percent to conform to present-day prices.

For the derivation of estimated costs of extensions and improvements to existing waterworks, a general figure of $35 per capita was used, $20 of which was allotted to source and treatment and $15 to distribution system improvements. Where detailed costs for such extensions and improvements have been directly available in sources above indicated, these costs have been used. For purposes of estimating total costs of extensions and improvements, the per capita costs were applied only to the populations benefited by such improvements and not to the total incorporated populations.

Included in the over-all estimate are costs for several improvements to existing waterworks, concerning which primary engineering studies of some type have been made, usually in the larger cities. With respect to these projects, actual engineering estimates amounting to $151,690,000 were prepared on the basis of present-day costs and no increase was allowed.

Results of the inventory.—According to the estimates which have been prepared on the basis of the unit costs above given, the total estimated cost of additional water supply facilities needed, as indicated by the present inventory, is approximately $683,300,000 and is distributed as follows:

	Number	Estimated cost
New systems	4, 863	$180, 960, 000
Extensions or improvements	6, 455	502, 340, 000

The numbers of incorporated communities, including their total populations, considered for new waterworks are listed by States in table 3. In this table it will be noted that the total population of the lowest community size group (population 500 and under) is about twice the total population in the next larger group (population 501 to 1,000) and somewhat over four times the total population of the largest community group. The disparity between the total number of communities in the "500 and under" group and the total for the other

two groups is much greater than the difference between their corresponding populations.

TABLE 3.—*Incorporated communities considered for new waterworks*

State	Population 500 and under		Population 501-1,000		Population over 1,001	
	Number of communities	Total population (1940)	Number of communities	Total population (1940)	Number of communities	Total population (1940)
Alabama	75	21,142	24	15,960	6	7,449
Arizona			5	4,375	3	4,142
Arkansas	193	50,114	29	19,460	3	3,422
California			1	677		
Colorado	42	8,324	4	3,015	5	8,032
Connecticut			2	1,312		
Delaware	14	3,957	2	1,164		
Florida	45	12,638	17	11,311	6	9,754
Georgia	150	44,874	29	18,165	4	5,696
Idaho	47	14,904	11	5,833		
Illinois	347	102,981	117	78,769	12	12,504
Indiana	147	42,529	33	21,032	5	5,680
Iowa	306	71,898	30	19,958	2	3,178
Kansas	203	49,754	18	11,041	2	2,464
Kentucky	69	21,013	20	13,077	4	5,231
Louisiana	44	14,715	14	9,474	5	8,061
Maryland	23	7,614	9	7,352	9	16,695
Michigan	94	32,508	27	17,438	3	4,034
Minnesota	211	57,956	29	17,462	2	2,782
Mississippi	90	23,804	14	8,422	2	6,618
Missouri	413	107,487	65	42,370	18	16,849
Montana	14	4,208	1	839	1	1,012
Nebraska	109	20,827	4	2,517	2	2,457
Nevada			1	964		
New Jersey	9	2,791	6	3,329	1	2,128
New Mexico	7	2,163	4	2,969		
New York	41	11,450	13	8,253	3	3,569
North Carolina	143	44,724	41	28,044	5	5,548
North Dakota	156	45,884	26	16,981	2	2,457
Ohio	205	67,027	72	44,161	4	6,295
Oklahoma	191	55,920	61	39,881	5	5,984
Oregon	9	2,079	2	1,231		
Pennsylvania	9	2,734	9	6,265	3	5,217
South Carolina	61	18,982	18	10,120	7	12,122
South Dakota	67	17,867	8	4,769		
Tennessee	27	7,687	1	560	3	4,683
Texas	41	10,809	11	7,364	12	17,988
Utah	16	4,269	5	3,481	2	9,292
Vermont	17	4,472	8	5,498	2	3,365
Virginia	41	12,662	5	2,952	2	2,257
Washington	12	3,651	3	2,108	2	4,023
West Virginia	32	9,010	8	5,430	1	1,133
Wisconsin	145	41,759	28	18,216	6	9,345
Wyoming	8	2,392	1	885		
Total	3,873	1,044,579	836	544,484	154	222,366

NOTE.—Data for Maine, Massachusetts, New Hampshire, Rhode Island, and District of Columbia not included, as no incorporated communities have been considered for new waterworks in these States.

The total estimated costs of the additional water facilities needed is broken down by States in table 4. In this table the costs of development and purification have been separated from the costs of distribution and the two estimates combined under the heading of "total costs."

It would be impracticable to show in this paper a complete break-

down of these estimates in terms of cost of water supply needs for individual communities, although this information has been collected and tabulated as a basis of the figures given in table 4.

As the detailed projects for meeting these improvements will be to a very large extent the responsibility of the local communities, it hardly seems necessary or justified to undertake any such detailed presentation here. The real purpose of presenting the estimates in their present form is to indicate what the total costs of meeting these needs in the various States may be expected to approximate in relation to the cost of fulfilling other sanitation needs as they may be developed from the present inventory. These broad estimates also will serve as a basis for comparing at the level of present costs the estimated requirements of each State in relation to those for other States.

TABLE 4.—*Cost summary—water supply*

[In thousands of dollars]

State	Development and purification	Distribution	Total	State	Development and purification	Distribution	Total
Alabama	2, 420	4, 490	6, 910	Nebraska	3, 640	5, 130	8, 770
Arizona	3, 200	970	4, 170	Nevada	80	70	150
Arkansas	3, 130	6, 400	9, 530	New Hampshire	160	280	440
California	41 040	5, 710	46, 750	New Jersey	3, 020	3, 630	6, 650
Colorado	3, 750	1, 970	5, 720	New Mexico	610	420	1, 030
Connecticut	1, 320	1, 990	3, 310	New York	25, 300	12, 510	37, 810
Delaware	280	610	890	North Carolina	4 040	7, 820	11, 860
District of Columbia	6, 850	5, 150	12, 000	North Dakota	3 060	5, 200	8, 260
Florida	2, 760	4, 100	6, 860	Ohio	23, 600	15, 510	39, 110
Georgia	5, 050	7, 710	12, 760	Oklahoma	5, 020	10, 260	15, 280
Idaho	960	1, 960	2, 920	Oregon	1, 590	1, 330	2, 920
Illinois	77, 600	18, 660	96, 260	Pennsylvania	24, 340	11, 800	36 140
Indiana	7, 400	8, 390	15, 790	Rhode Island	9, 280	860	10, 140
Iowa	3, 460	7, 210	10 670	South Carolina	1, 480	2, 770	4, 250
Kansas	3, 190	5, 070	8, 260	South Dakota	1, 550	1, 950	3, 500
Kentucky	5, 630	6, 520	12, 150	Tennessee	2, 250	3, 170	5, 420
Louisiana	1, 410	4, 270	5, 680	Texas	8, 650	4, 490	13, 140
Maine	1, 110	950	2, 060	Utah	2, 330	3, 530	5, 860
Maryland	37, 760	9, 470	47, 230	Vermont	1, 080	1, 780	2, 860
Massachusetts	17. 750	3, 080	20 830	Virginia	2, 390	2, 110	4, 500
Michigan	33, 670	6, 600	40, 270	Washington	4, 070	7, 070	11, 140
Minnesota	4, 240	7, 210	11, 450	West Virginia	1, 670	1, 480	3, 150
Mississippi	2, 110	3, 440	5, 550	Wisconsin	10 950	10, 180	21, 130
Missouri	16, 590	21, 450	38 040	Wyoming	1, 680	350	2, 030
Montana	230	1, 470	1, 700				
				Total	424 750	258, 550	683, 300

In compiling the data shown in tables 3 and 4, no estimates have been included for the costs of added water softening facilities in the various States, or for the populations thereby affected. Based on Olson's figures for the population now consuming water of various degrees of hardness, it may be estimated very roughly that about 27 million people in the United States consume water which would require softening to bring it to a hardness level of 80 to 100 parts per million. According to the latest supplementary data from the Public

Health Service water treatment census, approximately 8.7 million people were provided with water softening facilities in 1941. It therefore may be estimated that roughly 20 million people would still need such facilities if they could be provided. A similar estimate of needed facilities for removing iron and manganese from water supplies would be desirable but must be omitted here because of the lack of reliable data.

At present cost levels, it may be estimated that a first-class water softening plant with filters would cost about $50,000 per million gallons daily capacity. With a mean rate of water consumption of 120 gallons per capita daily, this would represent a construction cost of $6 per capita for softening plant. Applied to a population of 20 million, the total estimated cost would be $120,000,000 for softening of all water supplies not now thus treated and averaging more than 80 to 100 p. p. m. hardness. If this item be added to the total estimated cost of all other development and treatment facilities, as shown in table 4, the total cost under this item would be increased from $424,750,000 to $544,750,000 and the grand total for all water supply additions and improvements from $683,300,000 to $803,300,000.

In connection with these figures it is of particular interest to refer to an estimate of post-war needs for additions and improvements to existing waterworks systems in the United States compiled by the editor of the journal Water Works Engineering and published in that journal in February 1943 (*9*). This estimate did not include the cost of constructing complete new water systems for small communities, estimated in the present inventory at a total cost of $180,000,000. The total estimated cost of the additions and improvements to existing water supplies covered by Water Works Engineering was $650,000,000, based on data supplied from 92 cities of 100,000 population or more. This figure is slightly lower than the total of $683,300,000 derived from the present inventory, excluding water softening improvements. If the $180,000,000 for construction of new waterworks systems be added to the Water Works Engineering estimate, a total amount of $830,000,000 is obtained, which figure is not far from the total of $803,300,000 estimated from the present inventory. On this basis and assuming a total population of 84,500,000 now connected with waterworks systems, the cost of the improvements, including water softening and construction of new plants, would approximate $9.50 per capita.

Methods of fulfilling needs.—Under any general plan of water supply rehabilitation and improvement which may be envisioned at the present writing, the part to be played by the local waterworks departments and their State public utilities and health organizations would be the predominant one. Thus the local waterworks departments, thoroughly familiar with detailed local needs, would be in the best

position to draft plans for needed additions and improvements to their own water systems and likewise to supervise the construction work. Moreover, as public waterworks systems are to a large extent self-supporting and revenue-producing agencies, the local waterworks departments should be able, in a majority of cases, to handle the detailed financing of local improvements with such aid as might be necessary from State and Federal Governments. In some instances probably no outside aid, financial or otherwise, would be necessary, although experience has indicated that many desirable or even necessary water supply improvements, if left to the initiative of local authorities, sometimes are deferred too long under the pressure of local factional disputes and competition for funds for other improvement projects. Under these circumstances, the stimulus of State aid and educational efforts, backed by State laws and regulations, often is necessary. This is a proper and widely recognized function of State governmental agencies.

Before any water supply improvements can be undertaken, preliminary engineering surveys and detailed plans and specifications must be prepared, either by the waterworks department if it has the necessary technical facilities, or, otherwise, by private consultants with State aid and general supervision. It cannot be too strongly emphasized that these detailed surveys, estimates, plans, and specifications should be drawn up well in advance, so as to be ready when the time for action comes. Funds and personnel should be made available for this work without delay by appropriate action of the governmental and waterworks authorities concerned with this problem.

Construction of public waterworks systems, as well as additions and improvements to such systems, affords an ideal means of employment for a large and diversified group of individuals and industries. Water supply improvements are self-paying investments which add permanent assets to any community needing them. In the general scale of public works projects, whether for immediate post-war reemployment or for a long-range improvement program, waterworks always have merited and will continue to hold a very high place because of the essential nature of this utility and the widespread public benefits it bestows.

In financing water supply improvements, whether on a 10-year, a 20-year, or some other plan, funds usually are obtained through bond issues, repaid on some plan of amortization spread over short or long periods of time according to the policy and capital resources of the local water utility. In some communities many waterworks improvements are financed out of reserves accumulated from current water revenues, though this is the exception rather than the rule. In either

case the cost of any construction program becomes, as a practical matter, one of planned annual expenditure over a term of years."

An approximate idea as to the annual payments which would be required to amortize a total capital expenditure of $683,300,000 for fulfilling the detailed water supply needs embraced by this inventory (exclusive of water softening) may be gained by application of the usual formula for liquidating a given capital sum by equal annual payments over any given period of time, at any assumed rate of interest According to this formula, the annual payment (Y) required to liquidate a capital sum (C) in (n) years with an interest rate of (r) percent is $Y = C \times w$ where $w = [r/100] + [1 - (1 + r/100) - n]$.

For the purpose of illustration, let it be assumed that the period of annual payments was 20 years and the interest rate 3 percent On this basis annual payments of $45,930,000 as a rounded figure would liquidate a capital cost of $683,300,000 at the end of 20 years, including interest charges on annual unpaid balances The yearly payments in this particular case would amount to 6 722 percent of the original capital sum In a similar manner, it may be calculated that annual payments of about $54,000,000 would liquidate a capital sum of $803,300,000, which would include the total estimated cost of water-softening in addition to the items covered in the inventory.

If the total economic loss due to present deficiencies in public water supplies be considered as amounting to about $50,000,000 annually and the improvements included in the present inventory were to result in the elimination of this loss, or a major part of it, the saving thus effected would go far toward repaying the total cost of the improvements by the end of 20 years or thereabouts

A question may be raised as to the annual cost of operating the increased water supply facilities. Although this would be a definite and considerable item of cost, varying with the kind of added water service concerned, it would be spread among a large number of water consumers and would be readily absorbed in the general water service rates, as is customary in the ordinary operation of public waterworks systems So far as the present estimates are concerned, it quite logically may be neglected for this reason, as constituting a legitimate item in the operating expense of a water system.

As the useful life of most waterworks structures ordinarily exceeds 20 years, this period would be a fairly safe one over which to finance improvements, such as are included in the present inventory. For parts of a waterworks system, such as distribution reservoirs and pipes and the more durable structures connected with intake, pumping, and treatment works, it is customary to figure useful life for as long as 30 or 40 years, though some features such as pumps and certain treatment equipment may become outmoded by functional improvements in design before the equipment has become worn out.

Aside from the economic savings which would tend to make water supply improvements self-liquidating, certain intangible benefits would result which in some cases probably would exceed any direct financial return. For the nearly 5,800 small communities which this inventory has revealed as having no public water systems, the intangible benefits of providing these communities with public water supplies would be almost incalculable if they could be expressed in terms of general improvement in health conditions and betterment of living conditions in the individual homes, resulting from adequate supplies of safe water delivered to taps and the installation of water-carriage systems of sewage disposal. The health benefits would affect in some measure the rural districts immediately contiguous to these communities, to which are drawn many people from these outlying districts for local trade. Experience has shown that many small communities, where favorably located, tend to undergo accelerated growth and industrial development after being provided with public water supplies. A recent study in Florida and Georgia (*10*) has revealed that for industrial and residential areas the hardness of a water supply influences the rate of population growth, which is greater in cities providing softer water.

As to the extent of State and Federal aid which would be required in order to carry out any extensive program of public water supply construction, and the manner in which such aid best may be applied, anything further than very brief comment seems beyond the scope of this paper.

Because of the revenue-producing character of public water supply systems, it would appear that Federal aid, if needed, could be limited very properly to capital loans at low interest rates, to be repaid through some plan of amortization such as has been illustrated above. One of the more outstanding needs shown by the present inventory has been the construction of new water systems for many small communities which have only very limited capital resources. In such instances it is quite possible that some form of State or Federal aid would be necessary in order to initiate construction work on any comprehensive scale. In the case of small communities whose resources are not sufficient to permit the use of ordinary public financing through the sale of bonds, special loan arrangements probably would be necessary. Technical aid by the States in connection with the drafting of detailed plans and specifications would be needed in many such instances.

In view of the variety and large number of post-war reconstruction needs which may be expected to arise, many public works projects which in ordinary times would be highly desirable from the standpoint of the general public welfare will have to justify themselves as being of immediate economic benefit in order to obtain consideration. In some cases, public water supply improvements, when measured by this standard, will be found deferable. In other instances,

however, they doubtless will rank very high in both immediate and long-range value as a public investment, on which a substantial and certain return is assured, both financially and otherwise. It would be a very wise provision for the future to make a careful survey of this matter during the war in order that meritorious water supply improvements may be identified in advance and detailed plans prepared for carrying them out at the proper time after the war. In this respect, the present inventory is only a preliminary step. It should be followed up by a systematic study of the more urgent water problems which must be solved within a reasonably short time in order to avoid possible injury or even disaster to the public health. Such a study may be commended to the various States, with full cooperation by the local communities and by the Public Health Service which has a large fund of specialized technical information on this subject at its disposal. It should not be delayed lest intelligent action, based on facts, be laid aside at a critical future moment in favor of hasty and ill-advised projects which may be unnecessary or, at best, unproductive of any substantial future benefits.

Acknowledgment of the assistance in the preparation and analysis of the data incorporated in this inventory is made to Senior Public Health Engineer Maurice LeBosquet, Jr., of the Office of Stream Sanitation, and to Public Health Engineer Samuel R. Weibel, of the Office of Stream Pollution Investigations, Cincinnati, Ohio. The Sanitation Section under direction of Sanitary Engineer Director J. K. Hoskins rendered valuable aid and advice in the planning and arrangement of this review.

REFERENCES

(*1*) Manual of American Water Works Practice. Am. W. W. Assoc., 1925, ch. I.

(*2*) Weibel, S. R.: A summary of census data on water treatment plants in the United States. Pub. Health Rep., **57**:1679–1694 (Nov. 6, 1942). (Reprint No. 2416.)

(*3*) Hanson, Paul: Active problems in water purification J. Am. W. W. Assoc., **30**:1120 (July 1940).

(*4*) Public Health Service Drinking Water Standards and manual of recommended water sanitation practice. Pub. Health Rep., **58**:69–111 (Jan. 15, 1943). (Reprint No. 2440.)

(*5*) Whipple, G. C.: The value of pure water. *In* Biological Studies by the Pupils of William Thompson Sedgwick. Univ. of Chicago Press, Chicago, 1906.

(*6*) Shaw, E. L., and Chase, E. S.: Economics of water purification. J. New Eng. W. W. Assoc., **52**:131 (June 1938).

(*7*) Olson, H. M.: Benefits and savings from softened water for municipal supply. J. Am. W. W. Assoc., **31**:607–639 (April 1939).

(*8*) American Public Health Association, Committee on Water Supply: Waterborne outbreaks in the United States and Canada 1930–36 and their significance. Eighth annual year book Am. Pub. Health Assoc., 1937–38.

(*9*) Post-war waterworks will need hundreds of millions. Water Works Eng., **96**:161 (1943).

(*10*) Mees, C. A.: Influence of soft water on population growth. Water Works Eng., **95**:404 (1942).

COURT DECISION ON PUBLIC HEALTH

Filled milk law upheld.—(Kansas Supreme Court; *State ex rel. Mitchell* v. *Sage Stores Co. et al.*, 141 P.2d 655; decided October 2, 1943.) The so-called filled milk statute of Kansas made it unlawful "to manufacture, sell, keep for sale, or have in possession with intent to sell or exchange, any milk, cream, skim milk, buttermilk, condensed or evaporated milk, powdered milk, condensed skim milk, or any of the fluid derivatives of any of them to which has been added any fat or oil other than milk fat, either under the name of said products, or articles or the derivatives thereof, or under any fictitious or trade name whatsoever." This statute was held by the Supreme Court of Kansas to apply to a canned product manufactured by mixing sweet skim milk, refined cottonseed oil, and natural vitamin A and vitamin D concentrates and thereafter evaporating the mixture so as to reduce it to 40 percent of its original volume solely from the loss of water. In sustaining the constitutionality of the law, the following conclusions were among those reached by the court:

(*a*) The purpose of the statute was to preserve the public health and prevent fraud and deception of consumers.

(*b*) If the character or effect of an article, as intended to be used, is debatable, the legislature is entitled to its own judgment which cannot be superseded by the court's views.

(*c*) The fact that a food product is wholesome does not of itself make a prohibitory statute either inapplicable to the product or unconstitutional as applied to it.

(*d*) Whether regulation or absolute prohibition is necessary to attain a statute's purposes is a question for the legislature.

(*e*) The defendant's product was within the statute's purview and it was not material that the product was unknown when the law was enacted.

(*f*) Since the defendant's product was susceptible of being sold as and for evaporated milk, and was so sold, the legislature could prohibit its sale as an instrument of fraud and it was not material that the defendant intended that its product be sold for what it really was and without fraud or deception.

The court said that it had, in *Carolene Products Co.* v. *Mohler*, decided in 1940,[1] held the filled milk statute to be a valid health measure designed to protect the public against deception and fraud and that it adhered to that view now. It appeared that the product in the instant case was the same as the product condemned by the court in the earlier case except that the present product contained cottonseed oil while the former product contained coconut oil.

---

[1] For abstract of decision see Public Health Reports, Oct. 4, 1940, p. 1834.

PREVALENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED JANUARY 1, 1944

Summary

The number of reported cases of influenza increased from 83,973 for the preceding week to 126,299 for the current week. These figures are for 43 States and the District of Columbia, and are exclusive of New Hampshire, Vermont, Massachusetts, Delaware, and Mississippi (also New York State outside New York City)—States in which the disease is not reportable or which reported no cases during the 2 weeks. Of these 44 States (counting the District of Columbia as a State), 26 reported increases and 18 decreases. Of the total reported increase of 42,326 cases, an increase of 30,530 cases was reported in 3 States—Kentucky 18,271, West Virginia 8,321, and Texas 3,938. Some of these cases may be delayed reports.

The number of deaths from all causes in 89 large cities increased from 12,601 last week to 14,262. The 3-year average for the week is 9,481, or an indicated excess mortality above the normal expectancy of 50 percent during the current week. A comparison of rates based on actual populations of these cities would no doubt show a smaller excess. Deaths from influenza and pneumonia in a group of 38 scattered cities as reported to the Public Health Service for recent weeks are as follows:

	Nov. 27	Dec. 4	Dec. 11	Dec. 18	Dec. 25	Jan. 1
1943	254	381	459	833	1,063	1,214
1942	299	294	332	378	387	479
3-year average [1]	281	290	296	328	334	374

[1] Corrected figures.

A total of 463 cases of meningococcus meningitis was reported, more than in any week prior to 1943, as compared with 361 last week, an average of 259 for the next preceding 4 weeks, 187 for the corresponding week last year, and a 5-year median of 37. Increases occurred in all but two of the nine geographic areas, slight decreases being reported in the New England and East South Central. More than half of the current total was reported in six States, as follows (last week's figures in parentheses): New York 65 (43), Pennsylvania 45 (34), Ohio 21 (12), Illinois 36 (28), Michigan 38 (15), and California 35 (24).

The cumulative total for the fourth quarter of 1943 is 3,399, as compared with 1,103 for the corresponding period of 1942. A total of 17,922 cases was reported in 1943, the largest number for any year of record, as compared with 3,774 in 1942, and a 5-year median of 2,023.

Telegraphic morbidity reports from State health officers for the week ended January 1, 1944, and comparison with corresponding week of 1943 and 5-year median

In these tables a zero indicates a definite report, while leaders imply that, although none was reported, cases may have occurred.

Division and State	Diphtheria			Influenza			Measles			Meningitis, meningococcus		
	Week ended—		Median 1938-42	Week ended—		Median 1938-42	Week ended—		Median 1938-42	Week ended—		Median 1938-42
	Jan. 1, 1944	Jan. 2, 1943		Jan. 1, 1944	Jan. 2, 1943		Jan. 1, 1944	Jan. 2, 1943		Jan. 1, 1944	Jan. 2, 1943	
NEW ENGLAND												
Maine	0	0	0	87	-------	1	184	23	35	3	6	0
New Hampshire	0	0	0	------	-------	------	1	49	6	0	1	0
Vermont	0	0	0	189	-----	------	13	265	24	0	0	0
Massachusetts	21	4	2	------	------	-----	262	392	191	18	6	1
Rhode Island	0	0	0	60	------	------	106	3	8	4	7	0
Connecticut	1	0	0	683	11	1	9	411	67	7	3	1
MIDDLE ATLANTIC												
New York	11	14	20	[1] 199	[1] 15	[1] 12	542	762	645	65	19	5
New Jersey	2	0	12	270	21	17	437	150	88	23	8	0
Pennsylvania	9	16	16	57	6	-------	516	1,362	533	45	10	2
EAST NORTH CENTRAL												
Ohio	6	15	15	8,037	9	14	1,130	42	42	21	5	2
Indiana	3	2	12	117	17	17	126	82	25	8	4	0
Illinois	5	19	33	361	24	20	86	84	86	36	8	2
Michigan [2]	10	15	6	294	8	1	968	99	160	38	4	2
Wisconsin	3	1	1	2,323	45	44	419	217	217	5	0	0
WEST NORTH CENTRAL												
Minnesota	10	1	1	18	-------	-------	268	6	67	8	0	0
Iowa	1	8	3	4,377	-------	7	40	33	75	7	1	0
Missouri	1	11	10	68	1	5	18	7	7	16	6	1
North Dakota	2	2	2	595	15	17	329	3	16	2	0	0
South Dakota	6	1	2	1	1	1	80	97	4	2	0	0
Nebraska	7	2	0	393	------	------	5	106	4	8	8	0
Kansas	11	5	6	2,195	1	10	23	62	64	7	2	1
SOUTH ATLANTIC												
Delaware	0	0	0	------	-------	-------	4	4	1	1	0	0
Maryland [2]	8	2	4	586	4	7	72	8	9	12	10	1
District of Columbia	1	1	1	603	4	5	39	4	1	6	1	0
Virginia	1	14	32	9,690	432	260	409	47	47	7	7	2
West Virginia	2	1	6	12,068	18	17	98	1	16	0	1	1
North Carolina	4	26	24	223	26	6	300	16	65	5	5	1
South Carolina	10	7	7	6,155	674	440	79	2	6	3	8	1
Georgia	5	4	10	6,513	65	124	125	14	25	7	2	0
Florida [2]	5	6	6	140	1	16	26	4	2	7	0	0
EAST SOUTH CENTRAL												
Kentucky	7	6	6	20,491	25	25	8	51	32	7	2	3
Tennessee	6	1	8	1,753	18	42	66	14	55	5	0	0
Alabama	6	13	13	7,022	194	194	140	2	15	2	3	3
Mississippi [2]	4	9	9	-------	-------	------	-------	------	-------	3	2	0
WEST SOUTH CENTRAL												
Arkansas	6	14	14	5,345	108	108	22	34	44	4	5	0
Louisiana	2	9	9	4,136	10	10	1	9	7	7	2	1
Oklahoma	8	8	14	2,875	93	123	0	42	9	7	1	0
Texas	31	50	40	13,330	1,254	1,254	66	27	67	4	8	2
MOUNTAIN												
Montana	4	1	1	2,521	15	15	134	69	41	8	3	0
Idaho	0	2	1	29	2	2	3	38	25	0	0	0
Wyoming	0	0	0	[3] 952	55	55	13	2	2	0	1	0
Colorado	6	6	6	808	42	69	188	32	32	2	10	0
New Mexico	0	1	1	81	1	4	0	0	9	2	1	0
Arizona	0	2	2	824	119	120	26	10	10	3	0	0
Utah [2]	0	0	0	1,767	55	55	3	334	48	1	8	0
Nevada	0	0	0	792	------	-------	0	29	0	0	1	0
PACIFIC												
Washington	4	3	3	220	3	2	43	[4] 893	139	8	4	0
Oregon	4	2	3	2,811	18	40	55	296	31	4	12	0
California	27	24	19	4,429	30	38	168	49	191	35	12	2
Total	255	323	352	[3] 126,488	3,440	3,440	7,650	5,786	4,781	463	187	37
52 weeks	13,744	15,559	16,923	421,155	109,167	189,352	602,085	505,871	505,871	17,922	3,774	2,023

See footnotes at end of table

563186°—44-

Telegraphic morbidity reports from State health officers for the week ended January 1, 1944, and comparison with corrresponding week of 1943 and 5-year median—Con.

Division and State	Poliomyelitis			Scarlet fever			Smallpox			Typhoid and paratyphoid fever [4]		
	Week ended—		Median 1938–42	Week ended—		Median 1938–42	Week ended—		Median 1938-42	Week ended—		Median 1938-42
	Jan. 1, 1944	Jan. 2, 1943		Jan. 1, 1944	Jan. 2, 1943		Jan. 1, 1944	Jan. 2, 1943		Jan. 1, 1944	Jan. 2, 1943	
NEW ENGLAND												
Maine	0	0	0	22	14	12	0	0	0	1	6	0
New Hampshire	0	0	0	4	16	9	0	0	0	0	0	0
Vermont	0	0	0	14	9	8	0	0	0	0	0	0
Massachusetts	2	1	0	246	311	144	0	0	0	2	1	1
Rhode Island	0	0	0	4	14	8	0	0	0	0	0	0
Connecticut	0	0	0	34	29	29	0	0	0	0	0	0
MIDDLE ATLANTIC												
New York	2	1	2	252	285	299	0	0	0	1	2	6
New Jersey	1	2	1	84	60	95	0	0	0	2	0	1
Pennsylvania	0	1	0	213	180	180	0	34	0	1	2	7
EAST NORTH CENTRAL												
Ohio	0	0	1	212	225	225	0	5	2	5	2	3
Indiana	0	2	0	48	78	122	0	5	2	0	0	0
Illinois	5	3	3	160	141	182	0	1	1	1	2	2
Michigan [3]	1	3	0	160	160	194	0	0	0	2	2	2
Wisconsin	8	1	0	109	183	157	0	0	5	1	0	0
WEST NORTH CENTRAL												
Minnesota	0	0	1	85	68	68	0	0	19	0	0	0
Iowa	0	2	2	62	50	70	0	1	1	0	0	1
Missouri	1	0	0	45	57	57	0	1	0	0	3	1
North Dakota	1	0	0	9	12	12	0	0	0	0	0	0
South Dakota	0	0	0	30	22	22	0	0	0	0	0	0
Nebraska	0	2	0	47	19	19	0	1	1	1	0	0
Kansas	1	1	1	80	60	65	2	0	0	0	0	0
SOUTH ATLANTIC												
Delaware	0	0	0	1	11	8	0	0	0	1	0	0
Maryland [3]	2	0	0	57	29	35	0	0	0	2	1	3
District of Columbia	0	6	0	31	26	13	0	0	0	1	1	1
Virginia	0	0	0	50	50	49	0	0	0	2	5	5
West Virginia	0	1	1	46	28	51	0	0	0	0	0	1
North Carolina	1	0	0	49	98	44	0	1	0	0	0	1
South Carolina	0	1	1	10	11	9	0	0	0	0	2	0
Georgia	0	2	0	22	41	22	0	0	0	3	2	2
Florida [3]	0	0	0	9	13	10	0	0	0	4	1	1
EAST SOUTH CENTRAL												
Kentucky	0	1	1	54	41	53	0	1	0	82	1	2
Tennessee	0	0	0	19	21	52	0	0	0	1	0	2
Alabama	0	0	0	9	25	37	0	0	0	1	2	2
Mississippi [3]	1	1	1	7	16	8	0	0	0	0	1	0
WEST SOUTH CENTRAL												
Arkansas	1	0	0	8	9	9	0	1	1	3	2	2
Louisiana	1	0	0	7	11	8	0	0	0	2	4	5
Oklahoma	2	0	0	69	15	23	1	3	3	1	1	1
Texas	2	16	2	37	51	57	0	7	4	0	6	6
MOUNTAIN												
Montana	0	0	0	24	10	12	0	0	0	0	0	0
Idaho	0	0	0	47	17	8	0	0	0	1	0	0
Wyoming	[3] 0	1	0	3	46	6	0	0	0	0	0	0
Colorado	1	1	0	19	41	26	0	0	1	0	1	1
New Mexico	0	1	0	10	13	13	0	0	0	3	3	1
Arizona	0	1	0	20	6	7	0	1	1	0	1	1
Utah [3]	0	1	1	94	68	13	0	0	0	0	0	0
Nevada	0	0	0	0	1	0	0	0	0	0	0	0
PACIFIC												
Washington	1	0	1	150	42	42	0	0	1	1	0	6
Oregon	1	3	0	67	9	9	0	0	0	3	2	0
California	7	1	1	182	116	116	0	0	0	0	1	3
Total	[3] 42	50	36	3, 021	2, 858	2, 858	3	62	62	128	51	80
52 weeks	12, 401	4, 193	7, 288	140, 475	126, 853	155, 064	733	863	2, 462	5, 546	6, 703	9, 585

See footnotes at end of table

Telegraphic morbidity reports from State health officers for the week ended January 1, 1944, and comparison with corresponding week of 1943 and 5-year median—Con.

Division and State	Whooping cough			Week ended Jan. 1, 1944								
	Week ended—		Median 1938–42	Anthrax	Dysentery			Encephalitis, infectious	Leprosy	Rocky Mt. spotted fever	Tularemia	Typhus fever
	Jan. 1, 1944	Jan. 2, 1943			Amebic	Bacillary	Unspecified					
NEW ENGLAND												
Maine	3	89	42	0	0	0	0	0	0	0	0	0
New Hampshire	0	15	1	0	0	0	0	0	0	0	0	0
Vermont	15	44	30	0	0	0	0	0	0	0	0	0
Massachusetts	50	184	126	0	0	17	0	2	0	0	0	0
Rhode Island	8	13	13	0	0	0	0	0	0	0	0	0
Connecticut	17	50	43	0	0	1	0	0	0	0	0	0
MIDDLE ATLANTIC												
New York	116	349	391	0	1	9	0	2	0	0	1	1
New Jersey	48	131	131	0	0	0	0	0	0	0	0	0
Pennsylvania	57	188	252	0	0	0	0	0	0	0	0	0
EAST NORTH CENTRAL												
Ohio	39	104	151	0	0	0	0	0	0	0	2	0
Indiana	6	10	14	0	0	0	0	0	0	0	0	0
Illinois	38	123	123	0	0	0	0	0	0	0	4	0
Michigan [2]	70	351	266	0	0	4	0	1	0	0	0	0
Wisconsin	62	116	117	0	0	0	0	0	0	0	2	0
WEST NORTH CENTRAL												
Minnesota	16	30	30	0	0	0	0	0	0	0	0	0
Iowa	16	26	22	0	0	0	0	0	0	0	0	0
Missouri	8	13	11	0	0	0	1	0	0	0	0	0
North Dakota	2	16	7	0	0	0	0	0	0	0	0	0
South Dakota	0	7	2	0	0	0	0	0	0	0	0	0
Nebraska	9	2	2	0	0	0	0	0	0	0	0	0
Kansas	12	28	28	0	0	0	0	0	0	0	1	0
SOUTH ATLANTIC												
Delaware	0	2	2	0	0	0	0	0	0	0	0	0
Maryland [2]	28	55	46	0	0	0	1	1	0	0	2	0
District of Columbia	3	13	12	0	0	0	0	0	0	0	0	0
Virginia	95	10	36	0	0	0	212	0	0	0	4	1
West Virginia	29	13	13	0	0	0	0	0	0	0	0	0
North Carolina	62	76	70	0	0	0	0	0	0	1	0	1
South Carolina	102	33	25	0	0	0	0	0	0	0	1	5
Georgia	25	4	4	0	0	1	0	0	0	0	1	12
Florida [2]	19	6	6	0	7	2	0	3	0	0	0	7
EAST SOUTH CENTRAL												
Kentucky	24	4	39	0	0	0	0	1	0	0	0	0
Tennessee	9	19	19	0	0	0	1	0	0	0	0	2
Alabama	14	44	24	0	0	0	0	0	0	0	0	13
Mississippi [2]	------	------	------	0	0	0	0	0	0	0	0	3
WEST SOUTH CENTRAL												
Arkansas	21	17	10	0	1	20	0	0	0	0	0	0
Louisiana	0	9	5	0	0	0	0	0	0	0	0	2
Oklahoma	2	13	10	0	0	0	0	0	0	0	0	0
Texas	95	163	79	0	14	157	0	0	0	0	0	11
MOUNTAIN												
Montana	3	18	8	0	0	0	0	2	0	0	0	0
Idaho	1	2	2	0	0	0	0	0	0	0	0	0
Wyoming	3	1	8	0	0	0	0	0	0	0	[3] 0	0
Colorado	28	10	14	0	0	0	0	0	0	0	0	0
New Mexico	2	18	18	0	0	3	2	0	0	0	0	0
Arizona	20	7	7	0	0	0	17	0	0		0	0
Utah [2]	11	37	17	0	0	0	0	0	0	0	0	0
Nevada	0	6	0	0	0	0	0	0	0	0	0	0
PACIFIC												
Washington	34	17	17	0	0	0	0	0	0	0	0	0
Oregon	11	7	7	0	0	0	0	0	0	0	0	0
California	54	139	128	0	2	0	0	0	0	0	0	0
Total	1,287	2,632	2,632	0	25	214	234	12	0	1	[3] 18	58
52 weeks	176,415	177,916	177,916	65	2,129	18,182	4,558	692	30	437	801	4,533
52 weeks, 1942	------	------	------	78	1,179	12,127	6,405	568	45	452	915	3,720

[1] New York City only.
[2] Period ended earlier than Saturday.
[3] Delayed reports from Wyoming (included only in cumulative totals) are as follows: influenza, 1,000; poliomyelitis, 1; tularemia, 3.
[4] Including paratyphoid fever cases reported separately as follows: Massachusetts, 1; Georgia, 3; Florida, 2.

WEEKLY REPORTS FROM CITIES

City reports for week ended December 18, 1943

This table lists the reports from 86 cities of more than 10,000 population distributed throughout the United States, and represents a cross section of the current urban incidence of the diseases included in the table.

	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
NEW ENGLAND												
Maine:												
Portland	3	0	9	0	0	2	3	0	7	0	0	2
New Hampshire:												
Concord	0	0		0	2	0	1	0	1	0	0	0
Vermont:												
Barre	0	0		0	0	0	0	0	2	0	1	0
Massachusetts:												
Boston	2	0		2	12	7	28	2	47	0	0	9
Fall River	0	0		0	1	0	4	0	1	0	0	0
Springfield	0	2		0	19	0	0	0	4	0	0	4
Worcester	0	0		0	1	0	11	0	58	0	0	1
Rhode Island:												
Providence	0	0	34	1	73	0	5	0	1	0	0	6
Connecticut:												
Bridgeport	0	0		0	2	0	2	1	6	0	0	0
Hartford	0	0	5	2	0	0	3	0	4	0	0	1
New Haven	0	0	2	0	3	0	0	0	4	0	0	0
MIDDLE ATLANTIC												
New York:												
Buffalo	0	0		7	1	0	24	0	7	0	0	0
New York	19	3	357	15	304	26	160	5	156	0	3	52
Rochester	0	0		2	0	8	17	0	3	0	0	4
Syracuse	0	0		2	0	1	4	0	2	0	0	13
New Jersey:												
Camden	1	0	5	3	0	0	2	0	1	0	0	0
Newark	0	0	20	2	6	2	18	0	11	0	0	8
Trenton	0	0	27	1	2	1	5	0	1	0	0	1
Pennsylvania:												
Philadelphia	2	0	44	13	8	7	67	0	36	0	0	7
Pittsburgh	1	0	11	6	184	3	28	0	8	0	2	5
Reading	0	0		3	4	0	3	0	0	0	0	2
EAST NORTH CENTRAL												
Ohio:												
Cincinnati	8	0	9	3	13	2	4	0	23	0	0	2
Cleveland	0	0	74	1	201	2	16	0	38	0	0	12
Columbus	0	0	4	4	13	0	4	0	6	0	0	6
Indiana:												
Fort Wayne	0	0		2	0	0	7	0	0	0	0	0
Indianapolis	0	0		10	0	3	31	0	12	0	0	6
South Bend	0	0		0	58	0	0	0	3	0	0	0
Illinois:												
Chicago	3	0	59	7	4	20	55	0	51	0	0	20
Springfield	0	0	23	0	6	0	10	0	1	0	1	0
Michigan:												
Detroit	5	0	141	10	7	7	36	0	29	0	0	23
Flint	0	0		2	4	1	13	0	1	0	0	4
Grand Rapids	0	0		1	32	0	1	0	4	0	0	0
Wisconsin:												
Kenosha	0	0	1	0	0	0	0	0	3	0	0	0
Milwaukee	0	0	7	7	2	8	13	0	24	0	1	33
Racine	0	0		0	0	0	0	0	3	0	0	4
Superior	0	0		0	66	0	6	0	0	0	0	0
WEST NORTH CENTRAL												
Minnesota:												
Duluth	0	0		1	6	0	5	0	23	0	0	9
Minneapolis	7	0		7	31	4	22	0	48	0	0	5
St. Paul	0	0		7	40	0	19	0	23	0	0	6
Missouri:												
Kansas City	4	0	28	6	1	2	11	1	7	0	0	0
St. Joseph	0	0		0	0	1	0	0	2	0	0	0
St. Louis	0	0	48	14	5	12	39	0	9	0	2	10

City reports for week ended December 18, 1943—Continued

	Diphtheria cases	Encephalitis, infectious, cases	Influenza Cases	Influenza Deaths	Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
WEST NORTH CENTRAL—continued												
North Dakota:												
Fargo	0	0		0	46	0	0	0	1	0	0	0
Nebraska:												
Omaha	0	0	0	3	2	0	6	0	12	0	0	1
Kansas:												
Topeka	0	0		1	1	0	4	0	5	0	0	0
Wichita	1	0	3	2	14	1	3	0	2	0	0	2
SOUTH ATLANTIC												
Delaware:												
Wilmington	0	0		1	7	1	5	0	0	0	0	2
Maryland:												
Baltimore	3	0	62	8	24	6	36	0	18	0	0	31
Cumberland	0	0	1	0	0	0	0	0	0	0	0	0
Frederick	0	0		0	0	0	1	0	0	0	0	0
District of Columbia:												
Washington	1	0	1,348	7	36	4	25	0	27	0	1	1
Virginia:												
Lynchburg	0	0	91	0	250	0	0	0	1	0	0	13
Richmond	1	0	35	4	3	2	7	0	4	0	0	2
Roanoke	0	0		0	0	0	1	0	1	0	0	1
West Virginia:												
Charleston	0	0		0	0	0	0	0	2	0	0	0
North Carolina:												
Winston-Salem	0	0	3	0	28	0	1	0	3	0	0	0
South Carolina:												
Charleston	0	0	547	1	1	0	3	0	0	0	0	0
Georgia:												
Atlanta	0	0	238	1	4	0	9	0	0	0	0	0
Brunswick	0	0		0	15	0	1	0	0	0	0	0
Savannah	0	0	288	4	0	1	1	0	1	0	0	0
Florida:												
Tampa	1	0		0	0	0	3	0	2	0	0	0
EAST SOUTH CENTRAL												
Tennessee:												
Memphis	0	0	38	7	0	3	8	0	7	0	0	3
Nashville	0	0		2	0	1	3	0	1	0	0	3
Alabama:												
Birmingham	0	0	150	5	27	0	3	0	2	0	0	2
Mobile	0	0	40	3	0	2	3	0	0	0	0	0
WEST SOUTH CENTRAL												
Arkansas:												
Little Rock	0	0	25	0	0	0	0	0	0	0	0	0
Louisiana:												
New Orleans	3	0	18	2	3	2	16	2	4	0	2	1
Shreveport	0	0		1	0	0	6	0	0	0	0	0
Texas:												
Dallas	0	0	9	4	0	0	3	0	1	0	0	0
Galveston	1	0		0	0	0	0	0	0	0	0	0
Houston	5	0		1	2	1	4	0	4	0	0	0
San Antonio	1	0		3	0	0	5	1	1	0	0	1
MOUNTAIN												
Montana:												
Billings	1	0		1	1	0	0	0	0	0	0	0
Great Falls	0	0	478	1	29	0	2	0	8	0	0	0
Helena	0	0		0	0	0	0	0	2	0	0	0
Missoula	0	0	624	0	0	0	2	0	2	0	0	0
Idaho:												
Boise	0	1	11	0	0	0	0	0	2	0	0	0
Colorado:												
Denver	1	0	100	1	1	0	20	0	10	0	0	16
Pueblo	0	0		0	151	0	2	0	1	0	0	7
Utah:												
Salt Lake City	0	0		4	2	0	3	1	31	0	0	5

City reports for week ended December 18, 1943—Continued

	Diphtheria cases	Encephalitis, infectious, cases	Influenza Cases	Influenza Deaths	Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
PACIFIC												
Washington:												
Seattle	8	0	------	2	6	0	6	0	7	0	1	1
Spokane	0	0	7	3	13	1	1	0	9	0	0	3
Tacoma	1	0	------	0	4	1	0	0	30	0	0	3
California:												
Los Angeles	6	0	368	8	36	4	31	3	28	0	0	5
Sacramento	0	0	8	0	0	0	5	1	4	0	0	1
San Francisco	0	0	119	1	1	1	12	0	31	0	1	10
Total	84	6	5,519	220	1,818	150	918	17	934	0	15	369
Corresponding week, 1942	84	4	140	42	1,253	42	485	18	892	0	9	1,006
Average, 1938–42	102	------	872	[1] 41	[2] 1,142	------	[1] 429	------	915	7	18	1,099

Anthrax.—Cases: Philadelphia, 1.
Dysentery, amebic.—Cases: New York, 2; Detroit, 1; St. Louis, 1; Los Angeles, 1.
Dysentery, bacillary.—Cases: Worcester, 3; New York, 15, Chicago, 1; Detroit, 1; Charleston, S. C., 3; Los Angeles, 8.
Dysentery, unspecified.—Cases: Boston, 1; Richmond, 1; Memphis, 1; San Antonio, 4.
Tularemia.—Cases: Chicago, 2.
Typhus fever.—Cases: Charleston, S. C., 1; Savannah, 2; Tampa, 1; Mobile, 3; New Orleans, 2; Shreveport, 1; Houston, 3; San Antonio, 1; Los Angeles, 1.

[1] 3-year average, 1940–42.
[2] 5-year median.

Rates (annual basis) per 100,000 population, by geographic groups, for the 86 cities in the preceding table (estimated population, 1942, 34,560,200)

	Diphtheria case rates	Encephalitis, infectious, case rates	Influenza Case rates	Influenza Death rates	Measles, case rates	Meningitis, meningococcus, case rates	Pneumonia death rates	Poliomyelitis case rates	Scarlet fever case rates	Smallpox case rates	Typhoid and paratyphoid fever case rates	Whooping cough case rates
New England	12 4	5 0	124.2	12 4	281	22.4	141.6	7 5	335	0.0	2 5	67
Middle Atlantic	10 3	1 3	206 9	24 1	227	21.4	146.3	2 2	100	0 0	2.2	41
East North Central	9 4	0 0	187.0	27.6	239	25 3	115 3	0.0	116	0 0	1.2	65
West North Central	23 5	0 0	154.4	80.1	285	39.1	213 0	2 0	258	0 0	3 9	64
South Atlantic	10 6	0.0	4622 9	46.0	651	24.8	164.5	0.0	104	0.0	1.8	88
East South Central	0.0	0 0	1354 2	101 0	160	35 6	101 0	0 0	59	0 0	0.0	48
West South Central	29.3	0 0	152.5	32 3	15	8 8	99 7	8 8	29	0 0	5.9	6
Mountain	16.1	8.0	9751.7	56 3	1479	0.0	233 1	8 0	450	0 0	0.0	225
Pacific	17.5	0 0	877.3	21 0	105	12.2	96 1	7 0	191	0.0	3.5	40
Total	12.7	0 9	832.7	33 2	274	22.6	138.5	2.6	141	0 0	2.3	56

TERRITORIES AND POSSESSIONS

Hawaii Territory

Honolulu—Dengue fever.—During the week ended December 18, 1943, 24 cases of dengue fever were reported in Honolulu, T. H., bringing the total number of new cases to date to 1,308.

Plague (human).—On December 19, 1943, 1 death from human plague occurred in Kalopa, Hamakua District, Island of Hawaii, T. H. This brings the total number of deaths from plague in Hamakua District to 6, the previous deaths occurring on March 5, March 28, April 11, May 3, and August 22, 1943.

Plague (rodent).—Rats proved positive for plague have been reported in Hawaii Territory as follows: Island of Hawaii—Kapulena area, 1 rat on November 23, 1943; Paauhau area, 1 rat on November 11, November 26, and November 27, 1943, respectively; Maui Island—Makawao, 2 rats on November 25, 1943.

DEATHS DURING WEEK ENDED DECEMBER 25, 1943

[From the Weekly Mortality Index, issued by the Bureau of the Census, Department of Commerce]

	Week ended Dec 25, 1943	Corresponding week, 1942
Data for 90 large cities of the United States:		
Total deaths	12,646	8,879
Average for 3 prior years	8,739	
Total deaths, first 51 weeks of year	469,290	433,740
Deaths under 1 year of age	632	596
Average for 3 prior years	754	
Deaths under 1 year of age, first 51 weeks of year	33,089	30,048
Data from industrial insurance companies:		
Policies in force	66,110,248	65,277,668
Number of death claims	12,123	8,972
Death claims per 1,000 policies in force, annual rate	9.6	7.2
Death claims per 1,000 policies, first 51 weeks of year, annual rate	9.6	9.1

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—Week ended December 4, 1943.—During the week ended December 4, 1943, cases of certain communicable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox		16		353	603	72	96	115	139	1,484
Diphtheria		9	8	33	1	5	1			52
Dysentery (bacillary)				9						9
German measles		2		7	13			2	8	32
Influenza	2	212	20		195	30		3	44	506
Measles		2	1	415	209	11	2	43	19	702
Meningitis, meningococcus				5	2	2		2	1	12
Mumps		30		46	85	30	4	20	67	282
Poliomyelitis				1	1	1				3
Scarlet fever		18	7	151	137	33	21	25	34	426
Tuberculosis (all forms)		5	11	118	43	12	25	3	63	280
Typhoid and paratyphoid fever		6		12						18
Undulant fever					1			1	1	3
Whooping cough				177	198	23	6	16	18	438

CUBA

Habana—Communicable diseases—4 weeks ended December 11, 1943.—During the 4 weeks ended December 11, 1943, certain communicable diseases were reported in Habana, Cuba, as follows:

Disease	Cases	Deaths	Disease	Cases	Deaths
Diphtheria	23		Measles	16	
Leprosy	1		Tuberculosis	6	
Malaria	3		Typhoid fever	21	1

Provinces—Notifiable diseases—4 weeks ended December 4, 1943.—During the 4 weeks ended December 4, 1943, cases of certain notifiable diseases were reported in the Provinces of Cuba as follows:

Disease	Pinar del Rio	Habana [1]	Matanzas	Santa Clara	Camaguey	Oriente	Total
Cancer	2	1	7	4		14	28
Diphtheria		30	2	1		1	34
Hookworm disease		4					4
Leprosy		2			1		3
Malaria	77	21	20	46	15	297	476
Measles		17					17
Scarlet fever						1	1
Tetanus, infantile						1	1
Tuberculosis	20	12	14	39	15	34	134
Typhoid fever	15	38	9	33	4	22	121
Whooping cough	2						2

[1] Includes the city of Habana.

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

NOTE.—Except in cases of unusual prevalence, only those places are included which had not previously reported any of the above-named diseases, except yellow fever, during the current year. All reports of yellow fever are published currently.

A cumulative table showing the reported prevalence of these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday of each month.

(Few reports are available from the invaded countries of Europe and other nations in war zones.)

Plague

Peru.—During the month of October 1943, plague was reported in Peru as follows: Libertad Department, 1 case; Lima Department, 4 cases, 4 deaths; Piura Department, 3 cases.

Smallpox

Algeria.—During the period October 21–31, 1943, 72 cases of smallpox were reported in Algeria.

Basutoland.—During the month of July 1943, 42 cases of smallpox were reported in Basutoland.

British East Africa—Kenya.—Smallpox has been reported in Kenya, British East Africa, as follows: Weeks ended November 20, 1943, 164 cases, November 27, 1943, 218 cases.

Indochina (French).—For the period November 11–20, 1943, 83 cases of smallpox were reported in French Indochina.

Niger Territory.—For the period November 1–10, 1943, 18 cases of smallpox were reported in Niger Territory.

Sudan (French).—For the period October 21–31, 1943, 58 cases of smallpox with 3 deaths were reported in French Sudan.

Typhus Fever

Algeria.—For the period October 21–31, 1943, 17 cases of typhus fever were reported in Algeria.

Hungary.—During the week ended November 27, 1943, 17 cases of typhus fever were reported in Hungary.

Rumania.—Typhus fever has been reported in Rumania as follows: For the period November 24–30, 1943, 81 cases; for the period December 1–7, 1943, 143 cases.

Slovakia.—During the week ended November 20, 1943, 15 cases of typhus fever were reported in Slovakia.

Tunisia.—For the month of November 1943, 31 cases of typhus fever were reported in Tunisia.

FEDERAL SECURITY AGENCY

UNITED STATES PUBLIC HEALTH SERVICE

THOMAS PARRAN, *Surgeon General*

DIVISION OF PUBLIC HEALTH METHODS

G. ST. J. PERROTT, *Chief of Division*

The PUBLIC HEALTH REPORTS, first published in 1878 under authority of an act of Congress of April 29 of that year, is issued weekly by the United States Public Health Service through the Division of Public Health Methods, pursuant to the following authority of law: United States Code, title 42, sections 7, 30, 93; title 44, section 220.

It contains (1) current information regarding the prevalence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

The PUBLIC HEALTH REPORTS is published primarily for distribution, in accordance with the law, to health officers, members of boards or departments of health, and other persons directly or indirectly engaged in public health work. Articles of special interest are issued as reprints or as supplements, in which forms they are made available for more economical and general distribution.

Requests for and communications regarding the PUBLIC HEALTH REPORTS, reprints, or supplements should be addressed to the Surgeon General, United States Public Health Service, Washington, D. C. Subscribers should remit direct to the Superintendent of Documents, Washington, D. C.

Librarians and others should preserve their copies for binding, as the Public Health Service is unable to supply the general demand for bound copies. Indexes will be supplied upon request.

UNITED STATES GOVERNMENT PRINTING OFFICE, WASHINGTON : 1944

For sale by the Superintendent of Documents, Washington, D. C.

Price 5 cents. Subscription price $2.50 a year

Public Health Reports

VOLUME 59 JANUARY 14, 1944 NUMBER 2

IN THIS ISSUE

CONTENTS

Public Health Reports

Vol. 59 • JANUARY 14, 1944 • *No. 2*

ILLNESS FROM CANCER IN THE UNITED STATES [1]

By HAROLD F. DORN, *Senior Economist, United States Public Health Service*

I. Introduction

The increase in the number of deaths attributed to cancer during recent decades has aroused widespread interest in this disease and has resulted in an intensification of the efforts to discover its cause. From eighth or ninth in rank among the leading causes of death in 1900, depending on how causes of death are classified, cancer had advanced to second place in 1940, being exceeded as a cause of death only by diseases of the circulatory system. This change in rank is due in part to a decrease in the importance of certain diseases, diarrhea and enteritis, tuberculosis, and pneumonia, which formerly were among the leading causes of death, but more especially to an actual increase in both the number of deaths and the crude death rate from cancer itself. Even after the effect of the increasing proportion of the population in the older age groups is eliminated, the death rate from cancer shows a marked increase during the past 40 years although there is some indication that the rate of increase of the death rate is slowing down. Since this and other aspects of the trend in the mortality from cancer have recently been described in a series of reports, no further reference will be made to this matter here (*1–4*).

USES OF MORBIDITY RECORDS

In spite of the widespread interest in the increase in the number of deaths attributed to cancer, almost no information is available concerning the number of living persons who are afflicted with the disease. Some analysis has been made of the records of individual clinics and hospitals, but, although such records may be very accurate and yield useful information concerning various problems related to the occurrence and treatment of cancer, they are of limited value in answering such questions as: How many people are known to have cancer? What parts of the body are most frequently attacked? Does climate affect the occurrence of cancer? Is cancer more com-

[1] This is the first of three sections of a paper on illness from cancer in the United States. The remaining two sections will appear in early issues of the PUBLIC HEALTH REPORTS.

mon among Negroes than among whites? Do persons living in the open country have less cancer than persons living in cities? The answers to such questions depend upon careful epidemiological investigations of cancer in representative groups of the population.

Moreover, these and many similar questions cannot be completely answered by the use of mortality statistics alone. Since cancer of certain sites is more likely to result in death than cancer of other sites, conclusions concerning the number of persons with the disease as well as the tissues or organs affected, when based upon mortality records, will differ from corresponding conclusions drawn from morbidity records. Furthermore, as methods of therapy become increasingly effective, the types of cancer most readily cured will appear less and less frequently in mortality records.

DIFFICULTIES IN COLLECTING ILLNESS RECORDS

It is not easy to obtain accurate information concerning the number of persons with cancer. Experience has demonstrated that inquiries made by means of a house-to-house canvass do not obtain reliable data since many people do not know that they have cancer, while others will not admit the fact even if they know it to be true.

Regardless of how the data are collected, it is impracticable, if not impossible, to obtain information for other than diagnosed cases of cancer. Obviously, the number of persons with undiagnosed cancer or with precancerous conditions must remain unknown. Because of these considerations, when it was decided to initiate collection of information concerning the number of living persons with cancer, it was considered sufficient to collect information from hospitals, clinics, and private physicians alone. A complete coverage of such agencies in a community yields information concerning each case of diagnosed cancer except the few which are diagnosed and treated in some other community.

The morbidity rate for cancer determined in this manner will be affected by the effectiveness of the methods of therapy, the stage of the disease at which diagnosis is made, and by the proportion of the persons with cancer who seek medical care prior to death. For example, if each case lives only one year after diagnosis of cancer is made, the illness rate in any year will be approximately equal to the death rate in the following year. But if each case lives five years after diagnosis, the illness rate will be about five times the mortality rate. While the effect of these factors cannot be entirely eliminated, an attempt was made to minimize their influence by undertaking studies only in areas with superior medical and hospital facilities which were reasonably accessible to all groups of the population. This necessarily restricted the communities studied to urban areas.

II. Scope of Survey

SOURCE OF DATA

Ten areas were selected for study—Atlanta, Pittsburgh, Detroit, Chicago, New Orleans, Dallas and Fort Worth, San Francisco and Alameda County, Birmingham, Philadelphia, and Denver. In each case the county in which the city is located was also included except that Cherokee, Clayton, Cobb, De Kalb, Douglas, Fayette, Forsythe, Fulton, and Gwinnett Counties were included in the Atlanta area. The population of these areas numbered slightly more than 13 million in 1940 or about 10 percent of the total and 18 percent of the urban population of the United States. Records were collected in the first five areas for the calendar year 1937, in the next four areas for 1938, and in Denver for 1939.

Reports concerning each patient treated for or under observation for any malignant growth during a given calendar year were solicited by means of a questionnaire mailed to every physician and hospital in the study areas. A personal visit was made to physicians or hospitals failing to respond; in this way, reports were obtained from every hospital and from all but about 2 percent of the physicians.

Since many persons with cancer are seen or treated by more than one physician or hospital and since many persons receiving treatment in an important medical center are nonresidents, it proved necessary to obtain the name and address of each case. With this information, it was possible to distinguish duplicate reports and nonresidents, an essential requirement for the computation of resident illness rates.

Preliminary reports of the results of the survey for each area have been published elsewhere (*5–14*). For the present analysis, the study areas have been grouped by regions. Atlanta, Birmingham, New Orleans, Dallas, and Fort Worth comprise the southern cities; Chicago, Detroit, Pittsburgh, and Philadelphia comprise the northern cities; while Denver, San Francisco and Alameda County comprise the western urban areas.

ACCURACY AND VALIDITY OF ILLNESS RECORDS

The validity of the data collected depends upon the correctness with which the diagnosis of cancer is made. The definition of cancer must perforce be that of the individual physician making the diagnosis. In addition to other items of information, each respondent was requested to report whether or not the diagnosis of cancer was confirmed by a microscopic examination of tissue. Table 1 shows the percentage of cases with a microscopically confirmed diagnosis classified by the primary site of the neoplasm.

TABLE 1.—*Percentage of the reported number of cases of cancer with diagnosis confirmed by a microscopic examination of tissue by primary site and region*

Primary site	North	West	South
Buccal cavity	71	62	43
Lip	66	53	32
Tongue	76	77	62
Other	75	76	63
Digestive organs	57	60	45
Esophagus	57	48	52
Stomach and duodenum	41	47	32
Intestines	62	65	52
Rectum, anus	76	79	60
Biliary passages, liver	48	42	35
Pancreas, mesentery, peritoneum	46	48	37
Other	70	71	74
Respiratory system	66	64	56
Larynx	85	73	74
Bronchus, lung	53	59	43
Other	57	62	45
Genital organs	79	80	70
Uterus	82	84	73
Ovary, fallopian tube	85	86	78
Prostate	57	63	51
Other	85	80	71
Breast	81	79	69
Urinary organs	67	78	66
Kidney	67	72	55
Bladder	66	79	70
Other	84	94	80
Skin	60	49	24
Brain	66	68	69
Bone	67	64	52
Other and unspecified	73	73	57
Total	69	67	50
Total except skin	71	71	60
Number of cases	26,357	10,591	11,885

In the northern and western cities nearly 70 percent of all diagnoses were confirmed by a microscopic examination of tissue, but in the southern cities this was true for only 50 percent of the cases. One of the reasons for the lower percentage of cases with a microscopically confirmed diagnosis in the South is the larger proportion of cases with skin cancer in that area. Examination of tissue is regarded by many physicians as unnecessary or even undesirable if a patient has skin cancer. In the South only 24 percent of the diagnoses of skin cancer were confirmed by biopsy as compared with 49 percent in the West and 60 percent in the North. For diagnoses other than skin cancer, the percentage confirmed by biopsy or autopsy was 60 in the South and 71 in the North and West.

After the diagnosis of cancer has been correctly made, it frequently is difficult to determine the primary site of the disease. It was found that when the same case was reported by two or more physicians or hospitals, disagreement as to the primary site existed in about one-fourth of the cases. In these instances, diagnoses confirmed by a microscopic examination of tissue were taken in preference to clinical diagnoses.

Some of this disagreement concerning the primary site undoubtedly arose from carelessness in entering the correct information on record forms. A detailed comparison of the primary site reported on case records and death certificates has been published elsewhere and will be cited only briefly here (*15*).

For 13,524 cases of cancer, information was available from both case records and death certificates. The percentage agreement in diagnosis for these cases is shown in table 2. In this table the specific primary sites have been grouped into broad classes; for example, buccal cavity includes lip, tongue, mouth, jaw, pharynx, etc. For all cases combined, 77 percent of the specific primary sites entered on the death certificates agreed with the specific primary site taken from case records; for another 7 percent the primary site on the death certificate differed from that in the case reports, but still fell in the same broad group; 11 percent of the primary sites on the death certificates were in a different broad site group than the primary site on the case records while 5 percent of the causes of death were nonmalignant.

TABLE 2.—*Percentage distribution of cases reported in survey by primary site on the case schedule and type of diagnosis on death certificate*

Primary site on case schedule	Percentage of death certificates with diagnosis				Number of cases
	Of same specific site	In same broad group but different specific site	In different group	Nonmalignant cause	
Buccal cavity	63	16	17	4	583
Digestive tract	83	10	4	3	5,609
Respiratory system	68	16	10	6	965
Genitourinary system	83	5	8	4	3,488
Breast	86	[1] —	11	3	1,359
Skin	42	—	47	11	338
Brain	46	—	5	49	194
Bones	51	—	44	5	196
All other	51	—	41	8	792
Total	77	7	11	5	13,524

[1] A dash indicates that there were no subdivisions of the primary site group

The greatest disagreement arose from diagnoses of cancer of the brain. Nearly one-half of the deaths of such cases were attributed to a nonmalignant cause. This lack of agreement results, in many instances, from the entry of a vague diagnosis on the death certificate. Unless definite information that the tumor is malignant is entered on the death certificate, causes of death such as "brain tumor" are coded as nonmalignant. On the case schedule, the physician was requested to state whether or not the tumor was malignant, the method of diagnosis, and the primary site. It is apparent that an appreciable proportion of the deaths of persons with cancer of the brain are assigned to a nonmalignant cause because of the absence of the necessary spe-

cific information on the death certificates. Of course the diagnosis of brain cancer taken from case records may also be in error since this diagnosis is difficult to confirm prior to death.

III. Illness From All Forms of Cancer

WAYS OF EXPRESSING ILLNESS RATES

There is no simple answer to the question, "How many persons have cancer?" Some forms of cancer, especially those on the surface of the body, are observable shortly after the malignant growth begins, but many forms of internal cancer remain undetected until late in the course of the disease. This fact, coupled with the failure of some persons to seek medical care even after the disease is noticeable, makes the number of persons with cancer larger than the number with diagnosed cancer.

By definition, the number of persons with undiagnosed cancer is unknown. In order to keep the relative number of such persons as small as possible the present study was undertaken in large metropolitan areas where it was believed that most of the persons with cancer would seek medical care. Even so, however, part of the difference in the case rates of illness from cancer among the surveyed cities is undoubtedly due to variation in the proportion of persons with undiagnosed cancer.

Practically, the number of persons regarded as having cancer must be synonymous with the number of persons with diagnosed cancer. But this number also is ambiguous until some decision is reached concerning persons who have been diagnosed as having cancer, who have been treated and who are now under observation. Shall such persons be included with those who are being treated for cancer or shall the number of persons with cancer be only those actually under treatment? There is no general agreement on the answer to this question.

During this study an attempt was made to distinguish four classes of cases.

1. Cases first diagnosed in the study year.
2. Cases diagnosed prior to, but treated during, the study year.
3. Cases under observation only.
4. Cases first diagnosed at death.

The proportion of cases in each of these classes is shown in table 3.

TABLE 3.—*Number and percentage of reported resident cases of cancer by type of case for the white population in three geographic regions*

Type of case	Number of cases			Percentage		
	South	West	North	South	West	North
First seen in study year	4,085	4,019	16,723	60.0	54.7	53.0
First seen prior to but under treatment during the study year	1,727	1,765	7,650	25.4	24.1	24.2
Under observation only	817	1,347	3,694	12.0	18.4	11.7
Reported only at time of death	176	205	3,500	2.6	2.8	11.1
Total	6,805	7,336	31,567	100.0	100.0	100.0

In the subsequent discussion three different illness rates will be used.

1. The incidence rate, that is, the relative number of cases first diagnosed in the study year. Only cases in class 1 above are included.
2. The prevalence rate, that is, the relative number of cases treated or diagnosed at any time during the year. This includes cases in classes 1, 2, and 4 above.
3. The total case rate, that is, the relative number of known cases of cancer including those under observation only. This includes cases in all four of the above classes.

The number of persons who have been treated for cancer and who, during the year of the survey, were under observation only has been excluded from most of the data which follows because of the wide variability in the percentage of discharged patients who are kept under observation after the treatment has been terminated. In the northern and southern cities about 12 percent of the total cases reported were under observation but in the western cities 18.4 percent of the cases were only being observed. The variability of this percentage is considerably greater when the records of individual cities are compared.

ILLNESS RATES FOR THE TOTAL POPULATION

About 430 out of every 100,000 white persons living in cities in the United States either are under treatment for cancer or are under observation because of a previously treated cancer. Of this number, 380 actually have malignant neoplasms.

About 230 new cases of cancer are diagnosed during the course of a year among each 100,000 white urban residents. Many of these malignant growths are of recent origin, but some are far advanced.

These statements apply particularly to residents of large metropolitan centers. In smaller cities and towns, a larger proportion of the

persons with cancer may never seek medical treatment so that the number of known cases is correspondingly smaller.[2]

ILLNESS RATES FOR THE WHITE AND COLORED POPULATIONS

The rates for the colored are considerably less than those for the white population (fig. 1). This is especially true for males, the rates for the colored being only slightly more than half as large as the rates for the whites. The difference between the rates for white and colored females is much smaller than the corresponding difference between the rates for males but even so from 10 to 20 percent fewer colored than white women, relative to the number in the population, have a diagnosed cancer.

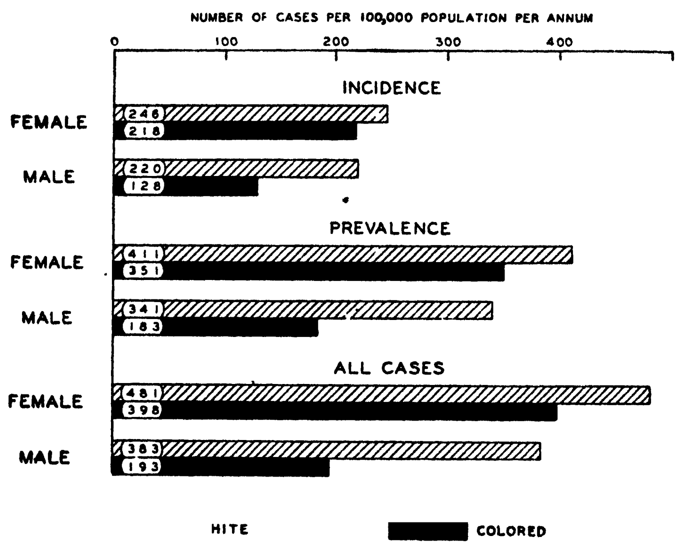


FIGURE 1.—Number of cases of cancer per 100,000 population by sex and color (standardized for age on the total urban population of the United States, 1940).

[2] The rates in this paper which are not for individual cities or regions were computed from cases obtained by adding the number of cases for the separate regions. The percentage distributions of the white and colored populations by regions for the cities surveyed and the 1940 population of all cities of 100,000 or more population are as follows:

Region	White		Colored	
	Census	Sample	Census	Sample
North	75	74	58	58
South	13	14	42	42
West	12	12		
Total	100	100	100	100

The rates for the colored population include only the cases reported in the northern and southern cities. Almost all of these cases were from the Negro population.

Do these differences mean that Negroes actually are less susceptible to cancer? Probably not, at least until it can be demonstrated that the same proportion of the persons who have cancer in both races receives medical care. The illness rates of Negro males are so low relative to those of Negro females and to those of each sex in the white population that it seems almost certain that a large proportion of male Negroes with cancer never receives any medical care for that condition.

It is believed, however, that Negroes are less susceptible to skin cancer than are whites. For all cities combined, the incidence rates for skin cancer were 38 and 28 for white males and females as compared with 5 and 4 for colored males and females. If cases with skin cancer are excluded, the incidence rate per 100,000 population of the remaining cases is 181 and 218 for white males and females compared with 123 and 214 for colored males and females. The ratio of the colored to the white rate is .68 for males and .98 for females. Although the female case rates are approximately equal, the rate for Negro males still is only about two-thirds that for white males.

SEX DIFFERENCES IN ILLNESS RATES

In both the white and colored populations the case rates of illness from cancer are higher for females than for males (fig. 1). With respect to the incidence rate, that is, the relative number of new cases of cancer diagnosed each year, the excess for white females is 12 percent and that for colored females is 70 percent. The relative excesses for the prevalence and total case rates are even greater, showing that females are kept under treatment longer and that a larger proportion are kept under observation after termination of treatment than is true for males.

A part of the observed sex difference in illness rates may be spurious since it is possible that a larger proportion of females than of males with a malignant neoplasm come to the attention of physicians. This is especially true of Negro females.

AGE DIFFERENCES IN ILLNESS RATES

One of the most striking features of the illness rates from cancer is the very rapid increase during the latter half of the life span (figs. 2 and 3). For white males the incidence rate for the oldest age group, 75 years and over, is more than 100 times the rate for the age group 20–24 years and more than 200 times the rate during the first 5 years of life. The corresponding figures for white females are somewhat less, being 76 and 191, respectively.

In the white population the rates at and shortly after birth, up to 4 years of age, are slightly higher than the rates for children between 5 and 10 years of age. The higher rate at birth undoubtedly is due to neoplasms of a congenital origin.

The increase in the incidence rate of cancer from the beginning until the end of adult life is considerably less for Negroes than for whites. For Negro males the rate for the age group 65–69 years is about 38 times that for the age group 20–24 years; for Negro females the increase is about 31 times. It is quite possible that the smaller increase in the illness rates with increasing age in the colored population is due to the failure of many elderly Negroes to receive medical

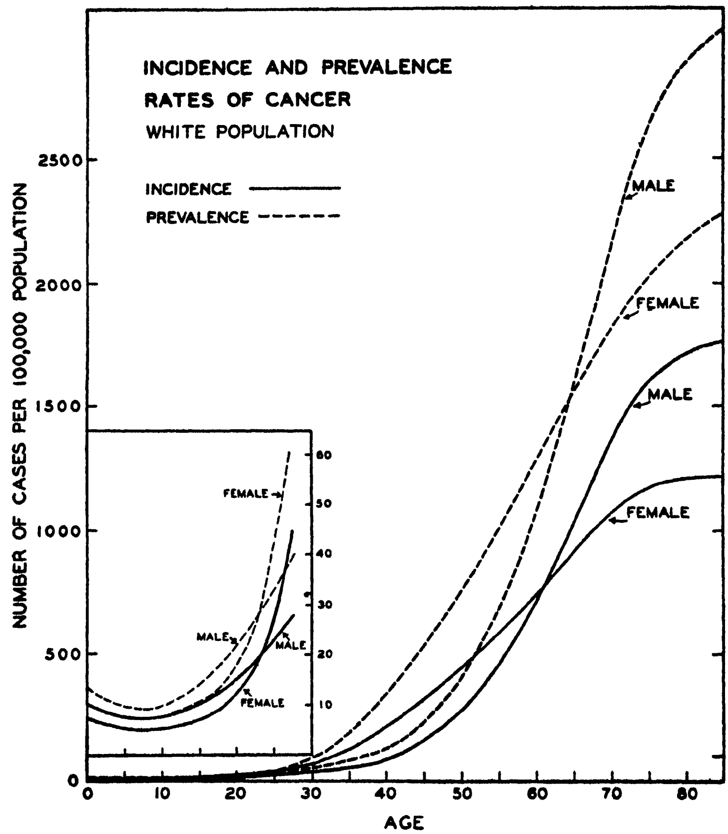


FIGURE 2.—Incidence and prevalence rates of cancer for the white population by age and sex.

care after a malignant tumor has developed. Some support for this belief is given by the fact that while the incidence rates for both white males and females continuously increase with age, the corresponding rates for colored males and females attain a maximum at about 70 years of age, after which a decrease occurs. It is uncertain whether this reported decrease is real, is the result of the failure of elderly Negroes to obtain medical care, or is due to the overstatement of age by Negroes in the census of population.

While the illness rate from cancer for all ages combined is higher for females than for males in both the white and colored populations

it is obvious from figures 2 and 3 that this is not true throughout the entire life span. The incidence rates are higher among females than among males from 25 to about 65 years of age, but during the first and the last years of life the male rates are higher than the female rates. This is true for both whites and Negroes and may be explained by the relatively larger number of malignant growths developing in the female genital organs, particularly in the uterus and the breast.

Cancer of the genital organs seems to develop at a younger age among Negro than among white women. The incidence rate of illness from all forms of cancer is higher among Negro women between 20

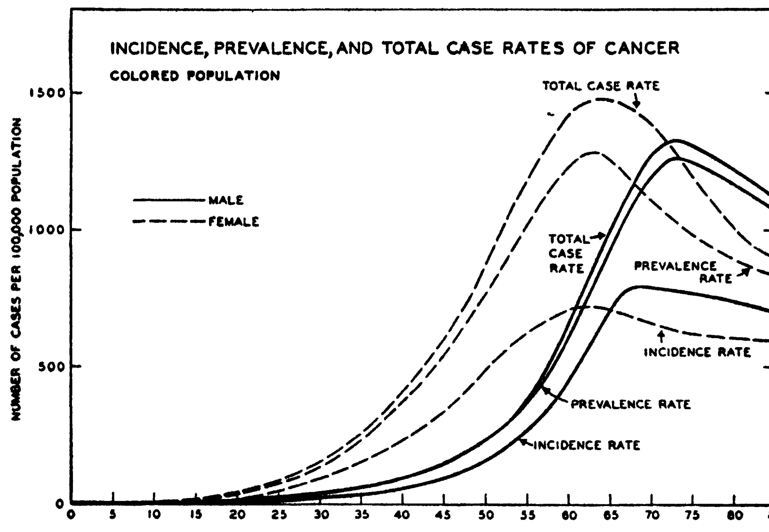


FIGURE 3.—Incidence, prevalence, and total case rates of cancer for the colored population by age and sex.

and 40 years of age; from 40 to 60 years of age the rates are practically equal. But after 60 years of age the rate for white females becomes increasingly greater until, in the oldest age group, 75 years and older, it is nearly double the rate for colored females.

The incidence rate for white males is higher than the rate for colored males at each age group.

Due to the large numerical increase in the illness rates from cancer during the latter half of adult life, it is difficult to visualize the relative amount of increase in the rates when they are plotted using an arithmetic scale as in figures 2 and 3. In figure 4 the incidence rates are plotted on semilogarithmic paper so that the relative change in the illness rate from one age to another may be more easily seen.

For females in both the white and colored populations, the most rapid increase in the proportion attacked by cancer occurs from about 20 to 30 or 35 years of age and is due, in large part, to the development

of cancer of the breast and uterus. Although numerically the proportion attacked by cancer continues to increase after age 35, the rate of increase becomes smaller and smaller with advancing age.

In the male population the situation is quite different. Between about 15 and 70 years of age, the incidence rates shown in figure 4 fall along a line which is approximately linear, indicating that the rate of increase in the proportion of males developing cancer remains roughly constant throughout this age range. Rather loosely, this may be interpreted as meaning that the susceptibility of males to

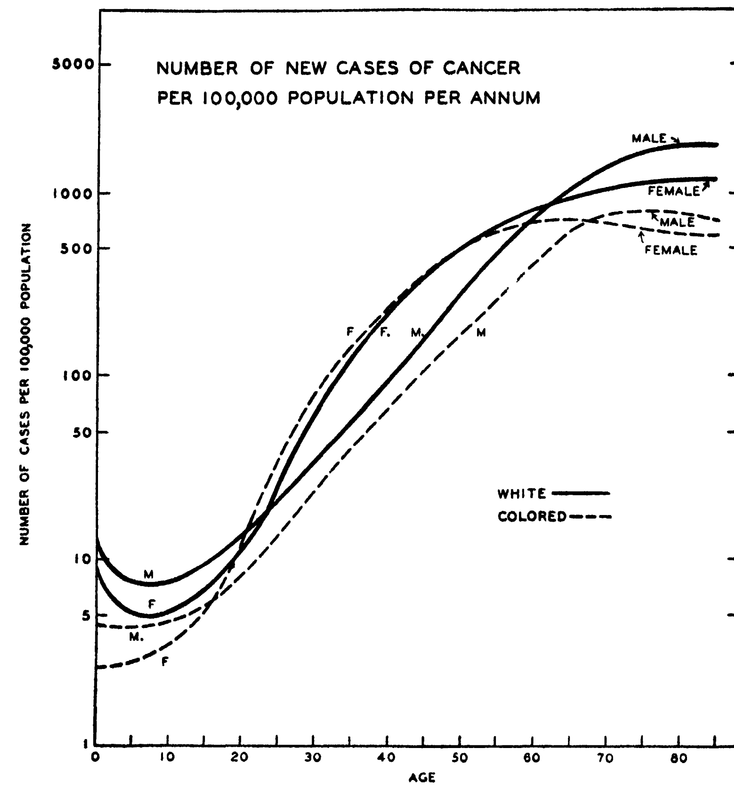


FIGURE 4.—Incidence rates of cancer by age, sex, and color of population (logarithmic vertical scale).

cancer increases uniformly as they grow older, if by susceptibility is meant the net result of the interaction of environmental and constitutional factors. The average increase in incidence rates from one 5-year age group to another is between 55 and 60 percent or between 11 and 12 percent per year of life. In other words, if 100 out of every 100,000 males have developed cancer by the time they are 40 years old, another 11 or 12 will develop cancer by the time they are 41 years old. These figures should not be taken too literally since the rate of increase does not remain strictly constant, but the deviation from

a straight line between about 15 and 70 years of age is not great enough to cause any appreciable error. The figures are cited merely to give an approximate idea of the rate of increase through most of the life span in the proportion of males who are attacked by cancer.

REFERENCES

(*1*) Gover, Mary: Cancer Mortality in the United States. I. Trend of recorded cancer mortality in the Death Registration States of 1900, from 1900 to 1935. Pub. Health Bull. No. 248. Government Printing Office, 1939.

(*2*) Gover, Mary: Cancer Mortality in the United States. II. Recorded cancer mortality in geographic sections of the Death Registration States of 1920, from 1920 to 1935. Pub. Health Bull. No. 252. Government Printing Office, 1940.

(*3*) Gover, Mary: Cancer mortality in the United States. III. Geographic variations in recorded cancer mortality for detailed sites, for an average of the years 1930–32. Pub. Health Bull. No. 257. Government Printing Office, 1940.

(*4*) Gover, Mary: Cancer Mortality in the United States. IV. Age variation in mortality from cancer of specific sites, 1930–32. Pub. Health Bull. No. 275. Government Printing Office, 1941.

(*5*) Mountin, Joseph W., Dorn, Harold F., Boone, Bert R.: The incidence of cancer in Atlanta, Georgia, and surrounding counties. Pub. Health. Rep., **54**: 1255–1273 (1939).

(*6*) Dorn, Harold F.: The incidence of cancer in Cook County, Illinois, 1937. Pub. Health Rep., **55**: 628–650 (1940).

(*7*) McDowell, Arthur J.: The incidence of cancer in Pittsburgh and Allegheny County, Pennsylvania, 1937. Pub. Health Rep., **55**: 1419–1451 (1940).

(*8*) McDowell, Arthur J.: The incidence of cancer in Detroit and Wayne County, Michigan, 1937. Pub. Health Rep., **56**: 703–739 (1941).

(*9*) McDowell, Arthur J.: The incidence of cancer in New Orleans, Louisiana, 1937. Pub. Health Rep., **56**: 1141–1170 (1941).

(*10*) McDowell, Arthur J.: The incidence of cancer in Dallas and Fort Worth, Texas, and surrounding counties, 1938. Pub. Health Rep., **57**: 125–139 (1942).

(*11*) Sommers, Herbert J.: The incidence of cancer in San Francisco and Alameda Counties, California, 1938. Pub. Health Rep., **57**: 1566–1586 (1942).

(*12*) Sommers, Herbert J.: The incidence of cancer in Birmingham and Jefferson County, Alabama, 1938. Pub. Health Rep., **57**: 377–397 (1942).

(*13*) Sommers, Herbert J.: The incidence of cancer in Philadelphia, Pennsylvania, 1938. Pub. Health Rep., **57**: 1843–1857 (1942).

(*14*) Sommers, Herbert J.: The incidence of cancer in Denver, Colorado, 1939. Pub. Health Rep., **57**: 1971–1986 (1942).

(*15*) Dorn, Harold F., and Horn, Joseph F.: The reliability of certificates of deaths from cancer. Am. J. Hyg., **34**: 12–23 (1941).

Appendix

TABLE 1.—*Number of cases of cancer per 100,000 population by age, sex, and color for all regions combined*

Age	Incidence				Prevalence				Total			
	Male		Female		Male		Female		Male		Female	
	White	Colored	White	Colored	White	Colored	White	Colored	White	Colored	White	Colored
Under 4	9	5	6	2	11	7	9	2	12	7	9	4
5-9	7		5	4	9		8	5	10		8	5
10-14	8	5	8	5	12	6	10	9	13	6	11	10
15-19	13		8	5	19		12	7	22		15	8
20-24	16	21	16	24	25	26	20	34	30	26	25	37
25-29	28		45	71	40		62	102	44		71	109
30-34	43	33	92	120	61	43	131	165	69	50	152	186
35-39	60	56	170	190	93	77	270	295	106	82	317	332
40-44	126	76	282	269	185	115	439	456	208	124	515	505
45-49	214	119	418	384	321	175	686	645	366	177	818	719
50-54	368	202	514	574	528	284	844	894	590	316	1,017	1,012
55-59	582	350	664	660	864	500	1,132	1,057	958	520	1,331	1,241
60-64	872	554	853	735	1,327	755	1,424	1,340	1,449	823	1,680	1,492
65-69	1,164	799	973	690	1,852	1,071	1,699	1,093	2,058	1,100	1,988	1,270
70-74	1,507	800	1,137	635	2,420	1,266	1,930	1,064	2,780	1,340	2,193	1,286
75 and over	1,758	690	1,185	606	3,011	1,071	2,266	846	3,394	1,118	2,555	910
All ages:												
Crude	196	87	234	166	302	123	391	265	337	130	457	300
Standardized [1]	220	128	246	218	341	183	411	351	381	193	481	398
Number of cases	11,273	550	13,554	1,152	17,368	781	22,[illegible]02	1,840	19,377	825	26,451	2,078

[1] Standardized for age using the total urban population of the United States, 1940.

TABLE 2.—*Rates of incidence of cancer per 100,000 white population by primary site groups, sex, and age for all regions combined*

Site group and sex	Under 10	10–19	20–24	25–29	30–34	35–39	40–44	45–49	50–54	55–59	60–64	65–69	70–74	75 and over	All ages: Crude	All ages: Standardized [1]	Number of cases
Buccal cavity:																	
Male	0.3	0.1	1.7	3.4	4.0	7.1	15.2	20.8	39.0	58.9	84.1	114.6	142.3	177.6	19.6	21.9	1,126
Female	0.1	0.1	0.2	0.6	1.6	2.7	4.9	6.1	6.9	14.5	17.0	25.9	21.8	43.9	4.7	5.0	274
Digestive organs:																	
Male	0.4	0.4	1.8	6.2	9.1	17.4	42.1	80.8	137.3	234.6	354.6	459.9	574.6	560.2	71.6	80.1	4,117
Female	1.1	0.9	2.8	6.7	13.5	20.3	35.9	63.4	96.6	164.8	234.1	270.2	359.3	418.2	52.9	56.3	3,057
Respiratory organs:																	
Male	0.5	0.1	0.4	0.6	4.0	5.5	16.3	25.9	45.5	62.7	77.6	79.8	75.0	56.7	16.6	17.5	952
Female	0.8	0.2	(2)	0.6	1.2	1.3	1.9	5.6	8.6	13.0	15.4	17.7	16.0	13.1	3.5	3.6	200
Uterus: Female	(2)	0.1	1.9	11.2	24.5	55.4	83.8	121.3	139.7	144.4	162.1	164.7	155.4	121.2	51.6	53.5	2,984
Breast: Female	(2)	0.5	1.9	8.5	25.1	50.7	91.1	122.9	129.0	169.6	190.4	193.3	205.5	184.5	56.0	58.4	3,237
Other genital: Female	0.3	0.3	1.9	4.0	7.0	11.1	19.4	28.4	28.5	35.0	47.8	49.8	61.2	36.9	13.4	14.0	776
Genital organs:																	
Male	0.4	0.3	2.0	4.2	5.7	3.7	5.2	7.7	16.4	34.9	79.1	161.0	287.9	359.1	20.9	25.5	1,204
Female [3]	0.3	0.9	5.7	23.7	56.6	117.2	194.3	272.6	297.2	349.0	400.3	407.8	422.1	342.6	121.0	125.9	6,997
Urinary organs:																	
Male	1.3	(2)	0.4	1.2	2.3	3.9	7.7	15.8	34.5	45.9	64.5	75.4	104.4	125.0	14.2	15.8	818
Female	1.0	(2)	(2)	0.9	1.8	1.3	4.7	9.4	15.8	19.9	30.9	47.8	70.2	51.3	7.8	8.3	450
Skin:																	
Male	0.9	0.6	3.4	5.2	8.9	11.0	22.6	34.4	63.1	96.2	139.0	200.9	222.0	395.7	33.7	38.2	1,940
Female	0.8	1.0	3.2	4.6	8.1	13.0	23.3	32.8	48.3	54.3	94.0	135.4	176.8	254.0	26.5	28.1	1,530
All sites:																	
Male	7.9	10.4	16.2	27.9	42.5	60.4	126.4	213.9	367.8	581.5	872.4	1,164.2	1,507.3	1,757.7	196.1	219.6	11,273
Female	5.6	7.9	15.6	45.0	92.1	170.2	281.7	417.8	514.1	663.9	852.5	973.3	1,137.2	1,185.2	234.4	246.2	13,554

[1] Standardized for age using the total urban population of the United States, 1940.
[2] Rate less than 0.1.
[3] Includes cancer of the breast, uterus, and other genital organs.

TABLE 3.—*Prevalence rates of cancer per 100,000 white population by sex, age, and groups of primary sites, all regions combined*

Age	Buccal cavity		Digestive organs		Respiratory organs		Uterus	Breast	Genital organs		Urinary organs		Skin		All sites	
	Male	Female	Male	Female	Male	Female	Female	Female	Male	Female[1]	Male	Female	Male	Female	Male	Female
Under 10	0.4	0.1	0.7	0.4	0.5	0.3	([2])—	—	0.4	0.4	1.7	1.3	1.1	1.1	10.3	8.1
10–19	0.3	0.4	1.2	1.1	1.0	0.5	0.1	0.9	0.3	1.4	0.1	0.2	1.1	1.0	15.3	11.2
20–24	2.1	0.4	3.2	3.2	0.6	—	1.9	2.5	3.0	6.6	0.4	—	4.0	3.5	25.4	20.2
25–29	3.8	1.2	9.4	9.1	1.2	1.1	15.8	12.3	5.4	32.7	1.8	1.5	6.3	6.0	39.5	62.2
30–34	5.7	2.0	13.8	18.3	4.4	2.5	38.0	35.3	9.0	82.5	2.9	2.4	10.2	10.1	60.5	131.2
35–39	11.9	2.9	27.8	30.4	8.7	2.7	91.8	85.0	5.8	195.5	6.1	2.8	15.8	16.0	93.0	270.4
40–44	21.7	6.7	60.3	54.5	22.1	3.3	131.1	146.5	7.4	309.2	13.0	7.0	31.8	30.9	185.4	439.0
45–49	33.4	7.5	119.3	97.2	37.8	9.0	206.7	226.5	10.1	473.5	24.3	12.3	50.3	44.9	321.4	685.6
50–54	55.4	10.5	196.8	149.4	65.1	14.8	235.3	240.8	23.4	522.0	49.3	22.8	86.6	64.7	528.2	844.1
55–59	91.4	17.8	334.9	259.7	92.9	18.6	274.5	318.4	55.2	653.1	74.6	29.2	139.1	79.4	863.5	1,132.3
60–64	150.1	27.2	527.8	355.4	120.4	22.6	294.8	362.4	123.9	729.8	103.8	48.5	200.0	148.6	1,327.2	1,423.7
65–69	196.6	40.8	728.3	460.3	111.7	29.0	313.8	388.6	259.0	779.2	140.0	86.6	305.4	192.7	1,851.9	1,698.5
70–74	236.5	37.4	909.3	615.4	126.1	29.6	275.2	398.5	441.8	759.2	189.7	106.1	372.7	267.6	2,420.0	1,930.4
75 and over	323.9	72.3	985.9	830.7	96.5	23.0	239.6	416.3	592.9	714.5	207.6	104.3	658.2	413.4	3,011.3	2,266.1
All ages:																
Crude	31.9	7.0	109.3	86.5	24.5	5.7	89.5	102.9	32.8	213.0	23.3	12.5	50.3	38.4	302.1	390.9
Standardized [3]	36.0	7.5	123.4	92.5	26.0	6.0	93.1	107.8	40.1	222.3	26.1	13.4	57.7	40.9	341.3	411.4

[1] Includes uterus and breast.
[2] A dash indicates a rate of less than 0.1
[3] Standardized for age using the total urban population of the United States, 1940.

LESIONS IN RATS GIVEN SULFATHIAZOLE, SULFADIAZINE, SULFANILAMIDE, SULFAMERAZINE, SULFAPYRAZINE, OR ACETYLSULFADIAZINE IN PURIFIED DIETS[1]

By K. M. ENDICOTT, *Passed Assistant Surgeon*, A. KORNBERG, *Assistant Surgeon (R)*, and F. S. DAFT, *Principal Biochemist, United States Public Health Service*

In a previous report from this laboratory (*1*), the lesions found in rats fed sulfaguanidine in purified diets were described. These lesions were calcification and hyalinization of arteries, necrosis and scarring of myocardium, hyaline necrosis and calcification of skeletal muscle, hydropic degeneration and necrosis of liver, granulocytic aplasia of bone marrow, and hemorrhages into subcutaneous tissues and various organs. Similar lesions were seen in rats given succinylsulfathiazole.

During the past year studies have been made with sulfathiazole, sulfadiazine, sulfanilamide, sulfapyrazine,[2] sulfamerazine,[3] and acetylsulfadiazine.[4] This report enumerates the various lesions which occurred and describes briefly those lesions not encountered in the previous study. The incidence of certain lesions is expressed in terms of percentage, but the authors wish to emphasize that experimental conditions were not necessarily parallel with the different drugs and that the figures are only very crude approximations.

EXPERIMENTAL METHODS

Albino rats of Wistar and Osborne and Mendel strains at or shortly after weaning were placed on purified diets in which the particular sulfonamide under study was incorporated at a 1 percent level. These diets varied to some extent but generally consisted of purified casein, about 18 percent; sucrose or glucose ("Cerelose"), about 70 percent; and salt mixture, 4 percent. The fat of the diet was either cod liver oil, 2 percent, and cottonseed (Wesson) oil, 3 percent, or Crisco, 8 percent, with a separate supplement of α-tocopherol and a vitamin A and D concentrate (Natola). Thiamine, riboflavin, pyridoxine, pantothenic acid, niacin and choline were given in generous dosage either by inclusion in the diet or by separate supplement.

Tissues were fixed in 4 percent solution of formaldehyde and embedded in paraffin. Bones were decalcified in 5 percent formic acid. Heart, lungs, liver, pancreas, spleen, adrenals, kidneys, tibia, femur, dorsal vertebrae, and thigh muscles were examined routinely. Urinary bladder, testicles, thyroid, thymus, skin, brain, and eyes were

[1] From the Divisions of Pathology and Chemotherapy, National Institute of Health.
[2] Furnished through the courtesy of Dr Warren Cox, Mead Johnson Co.
[3] Furnished through the courtesy of Dr J M. Sprague, Sharpe and Dohme, Inc.
[4] Furnished through the courtesy of Dr. E. H. Northey and Mr. W. O. Brewer, Calco Chemical Division, American Cyanamid Co.

studied in some rats. Six hundred and sixty rats were examined, of which 300 were given sulfadiazine, 170 sulfathiazole, 70 sulfanilamide, 60 acetylsulfadiazine, 19 sulfapyrazine, and 18 sulfamerazine; 23 were litter mate control rats given one of the purified diets without sulfonamides. Control studies of many rats have been made previously with most of the diets.

LESIONS

Bone marrow.—In the marrow of rats fed sulfanilamide, sulfathiazole, sulfadiazine, sulfamerazine, or sulfapyrazine, depletion of polymorphonuclear neutrophils, stab cells, and metamyelocytes was frequently encountered. The more immature cells of the granulocytic series were numerous and there was usually no diminution in cellularity of the marrow. A marked increase in the number of nucleated red cells was noted frequently, often in combination with a depletion of granulocytes. A few rats given sulfadiazine were killed after 5 days and in several of these rats the marrow contained many mature granulocytes. Aplasia was not seen with any of these drugs. Many of the marrows appeared normal.

Some rats were used for testing the potency of liver concentrate in correcting granulocytopenia and anemia. These rats were given sulfonamide-containing diets and when they developed anemia or granulocytopenia, were given doses of a concentrate. When a concentrate was active, it produced a prompt correction of the blood dyscrasia; some of these rats were killed. In such rats, a densely cellular marrow containing large numbers of polymorphonuclear neutrophils, stab cells, and metamyelocytes was usually found.

Most rats given acetylsulfadiazine died within 3 weeks and showed densely cellular marrow with extremely large numbers of polymorphonuclear neutrophils. Some rats survived and were killed after one month; in these, the marrow appeared normal.

Skeletal muscle.—Necrosis and calcification of skeletal muscle with histiocyte proliferation occurred rather infrequently. It was more common with sulfathiazole (5 percent) and with sulfanilamide (4 percent) than with sulfadiazine (0.3 percent), and was not encountered in the smaller series of animals given acetylsulfadiazine, sulfapyrazine, or sulfamerazine.

Cardiovascular system.—Calcification or hyalinization of one or more arteries (pulmonary, coronary, renal) was encountered in 10 percent of the rats given sulfathiazole, 3 percent of those given sulfanilamide, 0.3 percent of those given sulfadiazine, and in none of the other rats. Myocardial necrosis with loose scar formation (a striking lesion occasionally seen in rats given sulfaguanidine) was not seen in the present study.

Gross hemorrhage was noted in the following locations: subcutaneous tissues, chiefly the lower extremities, retroperitoneal connective tissue, peritoneal, pleural, and cranial cavities, thymus, epididymis, testicle, gastrointestinal tract, kidneys, eye, and nose. Hemorrhage occurred with sulfadiazine, sulfathiazole, sulfamerazine, or sulfapyrazine. Histologic study revealed simple extravasation of blood with no apparent lesions in adjacent vessels.

Liver.—Hydropic degeneration of liver cells was seen in 2.5 percent of the rats given sulfathiazole, 2 percent of those given sulfadiazine, and in 2 of 18 rats (11 percent) given sulfapyrazine. Focal, predominantly centrolobular hyaline necrosis of liver cells was seen in 9 percent of the rats given sulfathiazole, 5 percent of those given sulfadiazine, and 3 percent of those given sulfanilamide. Small to large amounts of granular hemosiderin were seen rather frequently in the Kupffer cells of livers of rats given sulfanilamide.

Spleen.—Hemosiderosis of the spleen was relatively slight and infrequent except in those rats fed sulfanilamide, most of which showed numerous hemosiderin-laden phagocytes especially in the red pulp surrounding the lymphoid follicles. Hemopoietic activity in the spleen was variable.

Kidney.—Intratubular deposits of sulfonamides with more or less severe damage of collecting tubules were encountered in rats given sulfadiazine, sulfathiazole, sulfapyrazine, sulfamerazine, or acetylsulfadiazine. The lesions were essentially similar with all these drugs. Further description of the renal lesions will be given in a subsequent report dealing with the prevention of renal lesions. Sulfonamide crystals were not seen in rats given sulfanilamide; a few of these rats showed accumulations of granular hemosiderin in the epithelium of the convoluted tubules.

Adrenal.—Hyaline necrosis of cortical cells with or without hemorrhage occurred in about 3 percent of the rats given sulfathiazole, sulfadiazine, or sulfanilamide, and in none of the rats given the other drugs.

Thyroid.—Hypertrophy, hyperemia, and hyperplasia of the thyroid gland were seen in rats given sulfadiazine, sulfanilamide, sulfapyrazine, sulfamerazine, or sulfathiazole. No statement as to relative incidence can be given since this organ has been examined only occasionally. One series of 50 rats (10 litters of 5 each) was given sulfadiazine for 30 days and then sacrificed. The thyroid glands of all of these rats showed gross enlargement and hyperemia. Microscopically, the acini were small, usually contained no colloid, and were lined by high cuboidal or columnar epithelium with indistinct cell margins and basally placed nuclei often showing mitotic figures. Capillaries were filled with blood. Frontal sections of the head through both eyes were made in 30 of these rats. No retrobulbar lesions were found. In a

series of 30 rats fed acetylsulfadiazine definite hyperplasia was not encountered; most of these rats died before the end of 30 days.

Miscellaneous.—Bronchitis, bronchiectasis, and pneumonia occurred occasionally. In a few rats there was bacteremia with colonies of coccobacilli in spleen, liver, kidney, and occasionally elsewhere. In several rats the spleen alone was involved. Bronchitis, bronchiectasis, pneumonia, bacteremia, splenic myelosis and hemosiderosis, and calcification of renal tubules were encountered singly or in combination in one or more control rats.

DISCUSSION

The earliest marrow lesion encountered in this laboratory was an increase in the number of mature granulocytes The most common lesion occurring later was a decrease in the number of segmenters, band forms, and metamyelocytes, with or without an increase in nucleated red cells. The relationship of marrow lesions to peripheral blood changes is not definitely known since marrow was studied only after death of the rat. The production and treatment of granulocytopenia and anemia in rats fed sulfathiazole, sulfanilamide, or sulfadiazine has been reported from this laboratory (*2*). The rats used in that study were examined and are included in this report. Most of the rats showing granulocytopenia also showed a depletion of mature neutrophils, stab cells, and metamyelocytes in the marrow, but in a few the marrow appeared normal. In some of the anemic rats an increase of nucleated red cells in the marrow was noted, but in others the marrow appeared normal. On the other hand, rats with normal peripheral blood occasionally showed depletion of granulocytes and increase of nucleated red cells in the marrow. In a previous study with sulfaguanidine (*1*), granulocytic aplasia was encountered while in the present study the marrow was never aplastic. The significance of this difference is not known. Hyperplasia of the marrow was found regularly in rats recovering from granulocytopenia; the recovery followed treatment with certain liver concentrates. A growth factor for *L. casei* has been isolated in crystalline form from liver (*3*, *4*), and from yeast (*3*). The factor from liver has been called vitamin B_c by some investigators (*4*). Crystalline material active for *L. casei* produced immediate and striking improvement in the peripheral blood of rats developing granulocytopenia and anemia on sulfaguanidine or succinylsulfathiazole regimens (*5*). Studies of the marrow following administration of this crystalline material have not been completed.

Necrosis and calcification of skeletal muscle which occur in rats given succinylsulfathiazole have been prevented by administration of vitamin E (*6*). The muscle lesions seen in the present study were indistinguishable from those seen with succinylsulfathiazole.

Spontaneous calcification and hyalinization of arteries in old rats have been reported (*7, 8*). Wilens and Sproul (*9*) report such lesions in coronary, pulmonary, and spermatic arteries of rats 2 to 3 years old. Ham and Lewis (*10*) produced calcification of coronary arteries, myocardium, and aorta in rats by large injections of irradiated ergosterol. Lehr and Antopol (*11*) reported necrosis and calcification of the media of the aorta in rats given a single fatal intraperitoneal injection of sodium sulfadiazine which survived 5 to 7 days. Lehr, Antopol, Churg, and Sprinz (*12*) noted similar lesions in rats following single and repeated intraperitoneal injections of the sodium salts of sulfathiazole, sulfamethylthiazole, or sulfapyradine. The etiology of the arterial hyalinization and calcification encountered in the present study is not known. The lesions are evidently not the result of old age since the age of the oldest rat was less than 6 months.

Hyperplasia of the thyroid gland in rats fed sulfonamide drugs or thiourea has been reported from two laboratories (*13, 14*). The hyperplasia was accompanied by a lowered basal metabolic rate and was prevented by administration of thyroxin but not by administration of para-aminobenzoic acid, vitamin C, liver, or iodine. Their results appear to support the hypothesis that the sulfonamides interfere directly with the synthesis of thyroid hormone. In this laboratory, rats given sulfadiazine, sulfamerazine, sulfapyrazine, sulfanilamide, or sulfathiazole have shown striking hyperplasia of the thyroid gland. Sluggish behaviour, cold extremities, and exophthalmos were frequent clinical observations in such rats.

Retrobulbar lesions were not encountered in a series of 30 rats with definite thyroid hyperplasia.

Rats fed acetylsulfadiazine, sulfaguanidine, or succinylsulfathiazole as 1 percent of the diet in this laboratory have not shown frank hyperplasia of the thyroid gland. In a previous study (*1*) with sulfaguanidine, many thyroid glands showed a depletion of acinar colloid but the epithelium was not hyperplastic and the empty acini appeared about normal in diameter. This may represent a mild response to the drug. The work of MacKenzie and MacKenzie (*13*) suggests that a larger dose of sulfaguanidine might have produced more striking lesions.

Hemorrhages into subcutaneous tissue, body cavities, and various organs with no demonstrable vascular lesions occurred in rats given sulfadiazine, sulfathiazole, sulfamerazine, or sulfapyrazine. They showed a very prolonged prothrombin time. Vitamin K prevented the hemorrhages and reduced the prothrombin time to normal levels. A detailed report will be made at another time.

SUMMARY

Rats given sulfadiazine, sulfathiazole, sulfanilamide, sulfamerazine, sulfapyrazine, or acetylsulfadiazine in purified diets were studied histologically. The following lesions occurred with some or all of the drugs: depletion of mature granulocytes in the bone marrow with or without an increase in nucleated red cells, necrosis and calcification of skeletal muscle, calcification and hyalinization of pulmonary, coronary, and renal arteries, hydropic degeneration and hyaline necrosis of the liver, necrosis and hemorrhage of the adrenal cortex, hyperplasia of the thyroid, hemorrhage into subcutaneous tissue, body cavities, and various organs, hemosiderosis of spleen, liver, and renal tubules, and renal intratubular sulfonamide deposits with varying degrees of tubular damage. The etiology of some of these lesions is discussed.

REFERENCES

(*1*) Ashburn, L. L., Daft, F. S., Endicott, K. M., and Sebrell, W. H.: Lesions in rats given sulfaguanidine in purified diets. Pub. Health Rep., **57**: 1883–1891 (1942).

(*2*) Kornberg, A., Daft, F. S., and Sebrell, W. H.: Production and treatment of granulocytopenia and anemia in rats fed sulfonamides in purified diets. Science, **98**: 20–22 (1943).

(*3*) Stokstad, E. L. R.: Some properties of a growth factor for *Lactobacillus casei*. J. Biol. Chem., **149**: 573–574 (1943).

(*4*) Pfiffner, J. J., Binkley, S. B., Bloom, E. S., Brown, R. A., Bird, O. D., Emmet, A. D., Hogan, A. B., and O'Dell, B. L.: Isolation of the anti-anemia factor (Vitamin B_c) in crystalline form from liver. Science, **97**: 404–405 (1943).

(*5*) Daft, F. S., and Sebrell, W. H. The successful treatment of granulocytopenia and leucopenia in rats with crystalline folic acid. Pub. Health Rep., **58**: 1542–1545 (1943).

(*6*) Daft, F. S., Endicott, K. M., Ashburn, L. L., and Sebrell, W. H.: Vitamin E deficiency in rats given succinylsulfathiazole in purified diets. Proc. Soc. Exp. Biol. and Med., **53**: 130–131 (1943).

(*7*) Hummel, K. P., and Barnes, L. L.: Calcification of the aorta, heart, and kidneys of the albino rat. Am. J. Path., **14**: 121–124 (1938).

(*8*) Hueper, W. C.: Spontaneous arteriosclerosis in rats. Arch. Path., **20**: 708 (1935).

(*9*) Wilens, S. L., and Sproul, E. E.: Spontaneous cardiovascular disease in the rat. II. Lesions of the vascular system. Am. J. Path., **14**: 201–216 (1938).

(*10*) Ham, A. W., and Lewis, M. D.: Experimental intimal sclerosis of the coronary arteries of rats. Arch. Path., **17**: 356–361 (1934).

(*11*) Lehr, D., and Antopol, W.: Toxicity of sulfadiazine and acetylsulfadiazine in albino rats with special reference to renal lesions and their significance. Urol. and Cutan. Rev., **45**: 545–554 (1941).

(*12*) Lehr, D., Antopol, W., Churg, J., and Sprinz, H.: Acute toxicity of sodium salts of sulfapyridine, sulfathiazole, and sulfamethylthiazole. Proc. Soc. Exp. Biol. and Med., **45**: 15–20 (1940).

(*13*) MacKenzie, C. G., and MacKenzie, J. B.: Effect of sulfonamides and thioureas on the thyroid gland and basal metabolism. Endocrinology, **32**: 185–209 (1943).

(*14*) Astwood, F. B., Sullivan, J., Bissell, A., and Tyslowitz, R.: Action of certain sulfonamides and thiourea upon the function of the thyroid gland of the rat. Endocrinology, **32**: 210–225 (1943).

PREVALENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED JANUARY 8, 1944

Summary

The reported number of cases of influenza was practically the same as for the preceding week, namely 126,610 currently as compared with 126,481 for the prior week. In view of the decline in the total mortality in 86 cities (from 13,925 to 12,950) and also in the reported deaths from influenza and pneumonia combined in 36 cities (from 1,211 to 997), about the only significance that can be attached to the comparison of the reported cases for the 2 weeks is an indication that the epidemic has stimulated the reporting of cases in some localities, that some of the current cases may be delayed reports, and that the epidemic is on the wane.

For the current week the number of reported cases declined in 27 States, and increased in 18 and the District of Columbia. (Three States, Massachusetts, Delaware, and Mississippi have reported no cases.) A decrease was recorded in all geographic areas except the West South Central, which area recorded only a slight decline in urban mortality. Both the excess urban death rate and the actual death rate (annual basis) for 90 cities declined in all geographic areas except the Pacific.

Deaths from influenza and pneumonia combined in 38 scattered cities, as reported to the Public Health Service in recent weeks, are as follows:

	1943					1944	
	Nov. 27	Dec. 4	Dec. 11	Dec. 18	Dec. 25	Jan. 1	Jan. 8
1943–44	254	381	459	833	1,063	1,215	997
1942–43	299	294	332	378	387	479	409
3-year average	281	290	296	328	334	374	438

Following the record high year of 1943, in which nearly 18,000 cases were reported, meningococcus meningitis continues at a high level. Continuing a sharp upward trend for the third successive week, the reported incidence increased to a total of 580 cases for the week, as compared with 463 last week, 278 for the corresponding week last year, and a 5-year (1939–43) median of 45. Ten States reporting 64 percent of the total are as follows (last week's figures in parentheses): Massachusetts 24 (18), New York 75 (65), New Jersey 31 (23), Pennsylvania 48 (45), Ohio 50 (21), Indiana 25 (8), Illinois 35 (36), Virginia 20 (7), Tennessee 29 (5), and California 36 (35). Seven other States reported 10 or more cases each.

Below are given the cumulative numbers of cases of certain diseases reported by the State health officers weekly by telegraph for 52-week periods of 1943 and 1942, and median numbers for comparable periods of the years 1938–42. Although these figures are preliminary and therefore more or less incomplete, in most instances they approximate closely the final figures and, when compared with similar figures for prior years, serve as an index to current trends.

52 weeks	Anthrax	Diphtheria	Dysentery			Encephalitis, infectious	Influenza	Leprosy	Measles
			Amebic	Bacillary	Unspecified				
1943	65	13,744	2,129	18,182	4,558	692	421,155	30	602,085
1942	89	15,559	2,492	24,056	12,820	564	109,167	45	505,871
Median, 1938–42	75	16,923	2,991	20,950	1,461	911	189,352	49	505,871

52 weeks	Meningitis, meningococcus	Poliomyelitis	Rocky Mountain spotted fever	Scarlet fever	Smallpox	Tularemia	Typhoid and paratyphoid fever	Typhus fever	Whooping cough
1943	17,922	12,401	437	140,475	733	801	5,546	4,533	176,415
1942	3,774	4,193	413	126,853	863	900	6,703	3,725	177,916
Median, 1938–42	2,023	7,288	417	155,064	2,462	1,641	9,585	2,780	177,916

Telegraphic morbidity reports from State health officers for the week ended January 8, 1944, and comparison with corresponding week of 1943 and 5-year median

In these tables a zero indicates a definite report, while leaders imply that, although none was reported, cases may have occurred.

Division and State	Diphtheria			Influenza			Measles			Meningitis, meningococcus		
	Week ended—		Median 1939-43	Week ended—		Median 1939-43	Week ended—		Median 1939-43	Week ended—		Median 1939-43
	Jan. 8, 1944	Jan. 9, 1943		Jan. 8, 1944	Jan. 9, 1943		Jan. 8, 1944	Jan. 9, 1943		Jan. 8, 1944	Jan. 9, 1943	
NEW ENGLAND												
Maine	0	0	1	73	-----	1	184	25	37	10	16	1
New Hampshire	0	0	0	3	3	-----	6	44	11	1	0	0
Vermont	0	0	0	100	24	-----	1	328	24	0	0	0
Massachusetts	13	2	5	-----	-----	-----	424	515	354	24	15	3
Rhode Island	0	2	0	77	25	-----	104	7	7	6	4	0
Connecticut	0	1	0	307	11	10	32	376	143	9	0	0
MIDDLE ATLANTIC												
New York	6	24	16	[1] 70	[1] 17	[1] 17	779	670	670	75	23	6
New Jersey	3	3	9	126	27	18	529	346	134	31	11	1
Pennsylvania	13	16	23	29	7	-----	801	2,238	1,121	48	20	2
EAST NORTH CENTRAL												
Ohio	11	18	18	5,365	16	16	2,059	40	40	50	8	4
Indiana	27	5	13	194	31	46	156	149	33	25	1	1
Illinois	10	16	32	211	13	18	280	169	89	35	6	2
Michigan [2]	0	4	4	27	1	1	500	45	83	11	5	0
Wisconsin	2	4	1	3,162	62	62	742	303	303	4	1	0
WEST NORTH CENTRAL												
Minnesota	4	2	2	-----	2	1	298	6	109	5	0	0
Iowa	3	5	9	3,860	2	2	44	50	90	3	2	1
Missouri	3	3	8	132	6	10	67	24	24	18	7	1
North Dakota	8	0	2	421	49	46	263	1	10	5	0	0
South Dakota	4	21	3	9	-----	-----	102	103	2	0	2	0
Nebraska	4	4	3	171	60	9	12	130	39	7	6	0
Kansas	4	4	6	1,156	6	16	46	64	112	6	2	2
SOUTH ATLANTIC												
Delaware	0	1	1	-----	-----	-----	19	6	6	0	0	0
Maryland [2]	5	10	4	2,354	9	11	93	13	13	11	16	1
District of Columbia	0	0	1	1,138	5	5	29	9	3	5	2	0
Virginia	5	15	22	8,335	659	557	208	53	60	20	30	1
West Virginia	2	8	8	10,536	38	21	175	15	15	5	2	0
North Carolina	13	24	27	419	12	12	341	9	69	8	3	2
South Carolina	5	4	11	6,702	651	909	95	5	11	8	11	1
Georgia	4	18	16	3,054	181	181	153	4	27	14	1	1
Florida	0	13	7	97	6	15	32	8	11	6	0	1
EAST SOUTH CENTRAL												
Kentucky	3	5	6	22,785	2	13	66	93	60	16	2	1
Tennessee	4	4	10	2,276	89	89	134	39	39	29	9	2
Alabama	5	1	12	3,884	106	177	281	7	25	4	4	1
Mississippi [2]	4	3	6	-----	-----	-----	-----	-----	-----	3	0	1
WEST SOUTH CENTRAL												
Arkansas	7	15	14	5,462	179	192	71	39	39	0	3	0
Louisiana	9	7	11	4,106	9	9	4	11	11	2	4	1
Oklahoma	4	5	13	3,310	74	222	7	6	6	6	4	1
Texas	37	48	34	24,454	1,157	1,157	274	22	50	10	3	1
MOUNTAIN												
Montana	4	0	1	1,665	14	14	246	38	38	4	0	0
Idaho	0	1	1	17	2	2	24	220	53	1	2	0
Wyoming	1	3	0	804	54	21	19	10	10	0	2	0
Colorado	6	13	12	847	45	62	127	87	87	1	5	0
New Mexico	3	1	1	9	-----	6	3	10	10	0	1	1
Arizona	1	0	2	589	115	178	20	7	47	2	3	1
Utah [2]	0	1	0	2,030	32	32	6	551	48	2	3	0
Nevada	0	0	0	1,208	-----	-----	0	33	0	0	2	0
PACIFIC												
Washington	11	7	0	453	-----	-----	23	695	182	6	5	0
Oregon	6	1	1	1,825	16	71	55	412	66	8	19	0
California	14	30	21	3,258	35	108	225	147	147	36	13	3
Total	268	372	405	126,610	3,852	3,852	10,159	8,182	7,816	580	278	45

See footnotes at end of table.

WEEKLY REPORTS FROM CITIES

City reports for week ended December 25, 1943

This table lists the reports from 87 cities of more than 10,000 population distributed throughout the United States, and represents a cross section of the current urban incidence of the diseases included in the table.

	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
NEW ENGLAND												
Maine:												
Portland	0	0	1	0	7	0	7	0	3	0	0	0
New Hampshire:												
Concord	0	0	15	1	0	0	1	0	0	0	0	0
Vermont:												
Barre	0	0	-----	0	0	0	0	0	0	0	0	0
Massachusetts:												
Boston	3	0	-----	2	25	10	48	1	58	0	1	23
Fall River	0	0	-----	0	0	0	0	0	4	0	0	0
Springfield	0	2	-----	0	34	0	1	0	6	0	0	2
Worcester	0	0	-----	0	12	0	12	0	36	0	0	3
Rhode Island:												
Providence	0	0	8	3	70	0	10	0	6	0	0	5
Connecticut:												
Bridgeport	0	0	53	3	0	0	6	0	5	0	0	0
Hartford	0	0	2	1	0	0	5	0	4	0	1	0
New Haven	0	0	9	2	0	1	6	0	1	0	0	0
MIDDLE ATLANTIC												
New York:												
Buffalo	0	0	-----	9	4	5	22	0	2	0	0	4
New York	11	3	475	23	416	28	235	0	138	0	0	48
Rochester	0	0	-----	1	0	3	17	0	2	0	0	2
Syracuse	0	0	-----	4	0	0	9	0	5	0	0	10
New Jersey:												
Camden	0	0	10	6	0	2	4	0	7	0	0	0
Newark	0	0	30	5	4	3	28	0	5	0	0	7
Trenton	0	0	18	4	1	1	2	0	10	0	0	0
Pennsylvania:												
Philadelphia	2	0	62	29	3	14	73	0	27	0	0	12
Pittsburgh	0	0	46	22	205	8	48	0	16	0	0	4
Reading	0	0	-----	4	2	1	3	0	0	0	0	0
EAST NORTH CENTRAL												
Ohio:												
Cincinnati	3	0	15	8	3	10	14	0	11	0	0	0
Cleveland	0	0	192	13	168	2	25	0	45	0	0	4
Columbus	0	0	929	10	4	2	7	0	3	0	0	2
Indiana:												
Fort Wayne	0	0		0	3	0	9	0	2	0	0	0
Indianapolis	2	0	-----	9	0	2	25	0	16	0	0	5
South Bend	0	0	-----	0	27	0	0	0	0	0	0	0
Illinois:												
Chicago	1	0	28	15	6	26	68	0	45	0	0	20
Springfield	0	0	15	0	3	0	4	0	1	0	0	0
Michigan:												
Detroit	2	0	81	11	4	13	40	0	35	0	0	14
Flint	0	0	-----	2	3	0	3	0	1	0	3	2
Grand Rapids	0	0	8	3	56	0	0	0	8	0	0	1
Wisconsin:												
Kenosha	0	0	-----	0	0	0	0	0	2	0	0	0
Milwaukee	0	0	9	9	9	6	15	0	30	0	0	28
Racine	0	0	-----	4	0	0	1	0	5	0	0	3
Superior	0	0	-----	0	76	0	0	0	0	0	0	1
WEST NORTH CENTRAL												
Minnesota:												
Duluth	0	0	-----	1	3	0	6	0	11	0	0	8
Minneapolis	3	0	-----	6	42	1	12	0	26	0	0	2
St. Paul	0	0	-----	4	14	1	12	0	17	0	0	0
Missouri:												
Kansas City	0	0	5	12	4	2	13	0	14	0	0	1
St. Joseph	0	0	-----	0	0	1	0	0	0	0	0	0
St. Louis	0	0	51	10	17	18	42	0	15	0	0	3
North Dakota:												
Fargo	0	0	-----	0	19	0	2	0	0	0	0	0
Nebraska:												
Omaha	1	0	-----	0	0	0	15	0	13	0	0	0
Kansas:												
Topeka	1	0	-----	0	0	1	0	0	0	0	0	1
Wichita	0	0	3	0	3	0	8	0	4	0	0	0

City reports for week ended December 25, 1943—Continued

	Diphtheria cases	Encephalitis, infectious, cases	Influenza Cases	Influenza Deaths	Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
SOUTH ATLANTIC												
Delaware:												
Wilmington	0	0	------	1	11	0	9	0	0	0	0	1
Maryland:												
Baltimore	2	0	134	14	19	6	53	0	24	0	0	15
Cumberland	0	0	1	0	0	0	2	0	0	0	0	0
Frederick	0	0	20	0	0	0	0	0	0	0	0	0
District of Columbia:												
Washington	0	0	845	5	25	2	22	0	16	0	0	3
Virginia:												
Lynchburg	0	0	164	0	122	0	2	0	4	0	0	1
Richmond	0	0	26	0	5	1	4	0	5	0	0	0
Roanoke	0	0	--	0	2	0	1	0	0	0	0	5
West Virginia:												
Charleston	0	0	8	0	0	0	0	0	6	0	0	0
Wheeling	0	0	---	0	0	0	4	0	1	0	0	0
North Carolina:												
Raleigh	0	0		0	2	0	0	0	0	0	0	0
Winston-Salem	0	0	126	0	63	0	3	0	0	0	0	1
South Carolina:												
Charleston	0	0	246	1	5	1	5	0	0	0	0	0
Georgia:												
Atlanta	0	0	277	3	0	0	7	0	3	0	0	0
Brunswick	0	0	---	0	9	0	2	0	1	0	0	0
Savannah	0	0	1,292	3	0	0	2	0	1	0	0	0
Florida:												
Tampa	0	0	1	1	0	1	2	0	0	0	0	0
EAST SOUTH CENTRAL												
Tennessee:												
Memphis	0	0	14	6	2	2	9	0	3	0	0	3
Nashville	0	0	---	1	0	0	7	0	2	0	0	1
Alabama:												
Birmingham	0	0	227	5	10	0	11	0	1	1	0	0
Mobile	0	0	46	2	1	2	7	0	0	0	0	0
WEST SOUTH CENTRAL												
Arkansas:												
Little Rock	1	0		0	3	0	2	0	0	0	0	0
Louisiana:												
New Orleans	1	0	54	8	4	2	24	1	2	0	0	1
Shreveport	0	0	------	1	0	0	7	0	1	0	0	0
Texas:												
Dallas	0	0	3	3	0	0	7	0	0	0	0	0
Galveston	0	0		0	0	0	2	0	0	0	0	0
Houston	3	0		1	2	0	7	0	2	0	0	0
San Antonio	1	0	5	6	3	0	7	0	1	0	0	1
MOUNTAIN												
Montana:												
Billings	0	0	--	0	0	0	2	0	2	0	0	0
Great Falls	0	0	592	0	11	1	1	0	4	0	0	4
Helena	0	0		0	0	0	0	0	1	0	0	0
Idaho:												
Boise	0	0	116	0	0	0	0	0	1	0	0	0
Colorado:												
Denver	1	0	42	12	4	0	13	0	6	0	0	15
Pueblo	0	0		0	88	0	2	0	1	0	0	0
Utah:												
Salt Lake City	0	0	1	4	3	0	5	1	26	0	0	1
PACIFIC												
Washington:												
Seattle	2	0	--	5	2	1	8	0	10	0	0	6
Spokane	0	0	3	2	8	1	3	0	19	0	0	0
Tacoma	0	0	---	0	4	0	1	0	16	0	0	0
California:												
Los Angeles	3	0	739	7	25	3	12	1	22	0	0	1
Sacramento	0	0	------	0	0	0	0	0	2	0	0	1
San Francisco	1	0	548	1	0	1	14	0	22	0	0	1
Total	44	5	7,595	328	1,680	185	1,122	4	844	1	5	276
Corresponding week, 1942	62	2	108	36	1,185	33	485	13	807	0	12	637
Average, 1938-42	103	------	1,398	[1] 52	[2] 1,336	------	[1] 466	--	948	8	16	1,060

Dysentery, amebic.—Cases: Boston, 2; New York, 1; Los Angeles, 2.
Dysentery, bacillary.—Cases: Worcester, 1; Bridgeport, 1; Buffalo, 1; New York, 1; Detroit, 1.
Dysentery, unspecified.—Cases: San Antonio, 9.
Leprosy.—Cases: New York, 1.
Tularemia.—Cases: Frederick, 1; Richmond, 2.
Typhus fever.—Cases: Savannah, 2; Tampa, 3; New Orleans, 1; Shreveport, 1; Houston, 4; San Antonio, 1.

[1] 3-year average, 1940-42.
[2] 5-year median.

Rates (annual basis) per 100,000 population, by geographic groups, for the 87 cities in the preceding table (estimated population, 1942, 34,647,200)

	Diphtheria case rates	Encephalitis, infectious, case rates	Influenza		Measles case rates	Meningitis, meningococcus, case rates	Pneumonia death rates	Poliomyelitis case rates	Scarlet fever case rates	Smallpox case rates	Typhoid and paratyphoid fever case rates	Whooping cough case rates
			Case rates	Death rates								
New England	7.5	5.0	218.6	29.8	368	27.3	238.5	2.5	306	0.0	5.0	82
Middle Atlantic	5.8	1.8	285.9	47.7	283	29.0	196.7	0.0	95	0.0	0.0	89
East North Central	4.7	0.0	751.0	49.4	213	35.9	124.1	0.0	120	0.0	1.8	47
West North Central	9.8	0.0	115.3	64.5	199	46.9	205.2	0.0	195	0.0	0.0	29
South Atlantic	3.4	0.0	5,365.7	47.8	449	18.8	201.6	0.0	104	0.0	0.0	44
East South Central	0.0	0.0	1,704.6	83.2	77	23.8	201.9	0.0	36	5.9	0.0	24
West South Central	17.6	0.0	181.9	55.7	35	5.9	164.3	2.9	18	0.0	0.0	6
Mountain	8.3	0.0	6,201.0	132.1	875	8.3	189.9	8.3	339	0.0	0.0	165
Pacific	10.5	0.0	2,254.5	26.2	68	10.5	66.4	1.7	159	0.0	0.0	16
Total	6.6	0.8	1,143.0	49.4	253	27.8	168.9	0.6	127	0.2	0.8	42

DEATHS DURING WEEK ENDED JANUARY 1, 1944

[From the Weekly Mortality Index, issued by the Bureau of the Census, Department of Commerce]

	Week ended Jan. 1, 1944	Corresponding week, 1943
Data for 89 large cities of the United States:		
Total deaths	14,262	10,175
Average for 3 prior years	9,481	
Total deaths, 52 weeks of year	481,270	441,832
Deaths under 1 year of age	736	687
Average for 3 prior years	608	
Deaths under 1 year of age, 52 weeks of year	33,650	30,603
Data from industrial insurance companies:		
Policies in force	66,110,955	65,282,186
Number of death claims	14,594	11,164
Death claims per 1,000 policies in force, annual rate	11.5	8.9
Death claims per 1,000 policies, 52 weeks of year, annual rate	9.7	9.1

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—Week ended December 11, 1943.—During the week ended December 11, 1943, cases of certain communicable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox		58		435	490	107	197	125	176	1,588
Diphtheria		23	1	25	2	3	3		1	58
Dysentery (bacillary)				2			2			4
German measles		1		9	17		40	4	3	74
Influenza	7	1,186	203		679	44			324	2,443
Measles		13	2	259	296	7	63	40	11	691
Meningitis, meningococcus		2		3	4		1			10
Mumps		8		27	152	58	33	43	40	361
Poliomyelitis					1		10			11
Scarlet fever		10	7	91	111	48	56	30	37	390
Tuberculosis (all forms)		5	2	81	51	11	2	12	27	191
Typhoid and paratyphoid fever		1	9	16		1			3	30
Undulant fever				4					1	5
Whooping cough		4		151	123	13	45	2	20	358

FINLAND

Notifiable diseases—October 1943.—During the month of October 1943, cases of certain diseases were reported in Finland as follows:

Disease	Cases	Disease	Cases
Cerebrospinal meningitis	14	Mumps	110
Chickenpox	462	Paratyphoid fever	112
Conjunctivitis	24	Pneumonia (all forms)	933
Diphtheria	2,691	Poliomyelitis	45
Dysentery	6	Puerperal fever	74
Gastroenteritis	2,261	Rheumatic fever	322
Gonorrhea	403	Scabies	3,447
Hepatitis, epidemic	945	Scarlet fever	814
Influenza	714	Syphilis	301
Laryngitis	60	Typhoid fever	27
Malaria	1	Vincent's angina	12
Measles	3,438	Whooping cough	603

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

NOTE.—Except in cases of unusual prevalence, only those places are included which had not previously reported any of the above-mentioned diseases, except yellow fever, during the current year. All reports of yellow fever are published currently.

A cumulative table showing the reported prevalence of these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.

(Few reports are available from the invaded countries of Europe and other nations in war zones.)

Plague

Belgian Congo.—During the week ended November 27, 1943, plague was reported in Belgian Congo as follows: Butakonda—2 cases with 2 deaths from pulmonary plague and 1 case with 1 death from bubonic plague; Blukwa—5 cases with 4 deaths.

Ecuador—Loja Province.—For the period November 1–15, 1943, 1 fatal case of plague was reported in Loja Province, Ecuador.

Egypt—Suez.—Bubonic plague has been reported in Suez, Egypt, as follows: Weeks ended—November 20, 1943, 12 cases, 4 deaths; November 27, 7 cases, 3 deaths; December 4, 10 cases, 8 deaths; December 11, 15 cases, 12 deaths; December 18, 39 cases, 27 deaths. For the period December 19–22, 1943, 11 cases were reported, making a total of 94 cases reported.

Smallpox

Algeria.—For the period November 1–10, 1943, 102 cases of smallpox were reported in Algeria.

Morocco (French).—For the month of October 1943, 58 cases of smallpox were reported in French Morocco.

Typhus Fever

Ecuador.—For the period November 1–15, 1943, 9 cases of typhus fever were reported in Ecuador.

Hungary.—For the week ended December 11, 1943, 19 cases of typhus fever were reported in Hungary.

Morocco (French).—For the month of October 1943, 53 cases of typhus fever were reported in French Morocco.

Rumania.—For the period December 8–15, 1943, 152 cases of typhus fever were reported in Rumania.

Slovakia.—For the week ended November 27, 1943, 15 cases of typhus fever were reported in Slovakia, and for the week ended December 4, 1943, 15 cases were also reported.

Spain.—For the week ended November 6, 1943, 9 cases of typhus fever were reported in Spain.

Trinidad—Port-of-Spain.—For the period September 16–30, 1943, 1 case of typhus fever was reported in Port-of-Spain, Trinidad.

Yellow Fever

Colombia.—For the period November 21–December 11, 1943, deaths from yellow fever have been reported in Colombia by Departments as follows: Boyaca, 7; Cundinamarca, 1; Intendencia of Meta, 5.

Gold Coast—Tamale.—On November 23, 1943, 1 case of suspected yellow fever was reported in Tamale, Gold Coast.

Senegal.—On November 13, 1943, 1 case of yellow fever was reported in Tambacounda and for the period November 11–20, 1943, 1 fatal case of yellow fever was reported in Velingara Casamance, Senegal.

FEDERAL SECURITY AGENCY

UNITED STATES PUBLIC HEALTH SERVICE

THOMAS PARRAN, *Surgeon General*

DIVISION OF PUBLIC HEALTH METHODS

G. ST. J. PERROTT, *Chief of Division*

THE PUBLIC HEALTH REPORTS, first published in 1878 under authority of an act of Congress of April 29 of that year, is issued weekly by the United States Public Health Service through the Division of Public Health Methods pursuant to the following authority of law: United States Code, title 42, sections 7, 30, 93; title 44, section 220.

It contains (1) current information regarding the prevalence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

The PUBLIC HEALTH REPORTS is published primarily for distribution, in accordance with the law, to health officers, members of boards or departments of health, and other persons directly or indirectly engaged in public health work. Articles of special interest are issued as reprints or as supplements, in which forms they are made available for more economical and general distribution.

Requests for and communications regarding the PUBLIC HEALTH REPORTS, reprints, or supplements should be addressed to the Surgeon General, United States Public Health Service, Washington, D. C. Subscribers should remit direct to the Superintendent of Documents, Washington, D. C.

Librarians and others should preserve their copies for binding, as the Public Health Service is unable to supply the general demand for bound copies. Indexes will be supplied upon request.

UNITED STATES GOVERNMENT PRINTING OFFICE, WASHINGTON : 1944

For sale by the Superintendent of Documents, Washington, D. C.

Price 5 cents. Subscription price $2.50 per year

Public Health Reports

VOLUME 59 **JANUARY 21, 1944** NUMBER 3

IN THIS ISSUE

CONTENTS

Public Health Reports

Vol. 59 • JANUARY 21, 1944 • *No. 3*

ILLNESS FROM CANCER IN THE UNITED STATES[1]—Con.

By HAROLD F. DORN, *Senior Economist, United States Public Health Service*

IV. Illness from Cancer of Specific Sites Classed in Broad Groups

VARIATIONS IN THE PRIMARY SITE OF CANCER BETWEEN MALES AND FEMALES

In about one-half (48 percent) of the white males and three-fourths (74 percent) of the white females who develop cancer, the growth originates in either the digestive or the genital systems (table 4). Among females the genital system is attacked most frequently while among males the most frequent localization is in the digestive system. In other words, out of every 100 white women who develop cancer, 51 will have cancer of the genital organs and 23 will have cancer of the digestive system. Out of every 100 white men who develop cancer, 36 will have cancer of the digestive system, 17 will have cancer of the skin, and 12 will have cancer of the genital system. Since the relative frequency of the different primary sites depends upon the age composition of the population the above statements should be interpreted as applying to a group of persons with an age composition similar to that of the total urban population in 1940.

TABLE 4.—*Primary site of development of cancer among white males and females*[1]

Primary site[2]	Male	Female
Respiratory system	8	2
Urinary system	7	3
Buccal cavity	10	2
Skin	17	11
Digestive tract	36	23
Genital system	12	51
All other sites	10	8
Total	100	100

[1] Percentage distribution of standardized rates for all ages using the total urban population of the United States, 1940, as standard.
[2] The classification of the primary site of cancer follows the International List of Causes of Death.

[1] This is the second of three sections of a paper on illness from cancer in the United States. The first section appeared in the PUBLIC HEALTH REPORTS, 59: 33-48 (Jan. 14, 1944). The remaining section will appear in an early issue. The numbering of tables and figures is consecutive throughout the three sections.

It has been pointed out that the number of new cases of cancer developing each year in the white female population is about 12 percent greater, on a relative basis, than the number of new cases developing in the white male population. As can be seen from figure 5, the

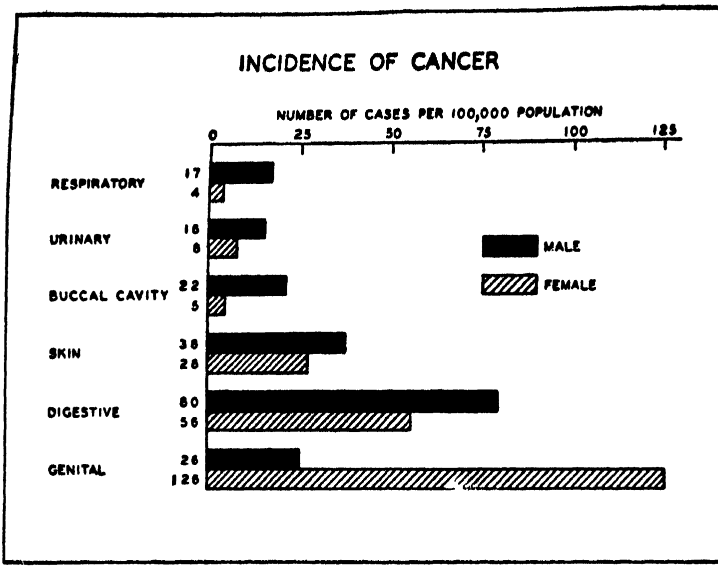


FIGURE 5.—Incidence rates of cancer for the white population by sex and primary site (standardized for age on the total urban population of the United States, 1940).

higher average illness rate among females is due to their greater probability of developing genital cancer, for if cancer of the genital system is excluded, the incidence rate for white males is 60 percent higher than the corresponding rate for white females.

For each of the five other broad groups of primary sites shown in figure 5, the male rate is definitely higher than the female rate. The male rates for cancer of the skin and digestive system are about 40 percent higher than the female rates; for cancer of the urinary system the rate is twice as great, while for cancer of the buccal cavity and respiratory system the rates are four times as great.

In the colored population the male rates are higher for cancer of the buccal cavity, respiratory, digestive, and urinary systems, and lower for cancer of the genital system just as in the white population. But contrary to the situation among white males and females, the rate for cancer of the skin is about the same for both colored females and males (fig. 7).

Incidence rates by age for certain groups of primary sites are shown in figure 6 for white males and females.

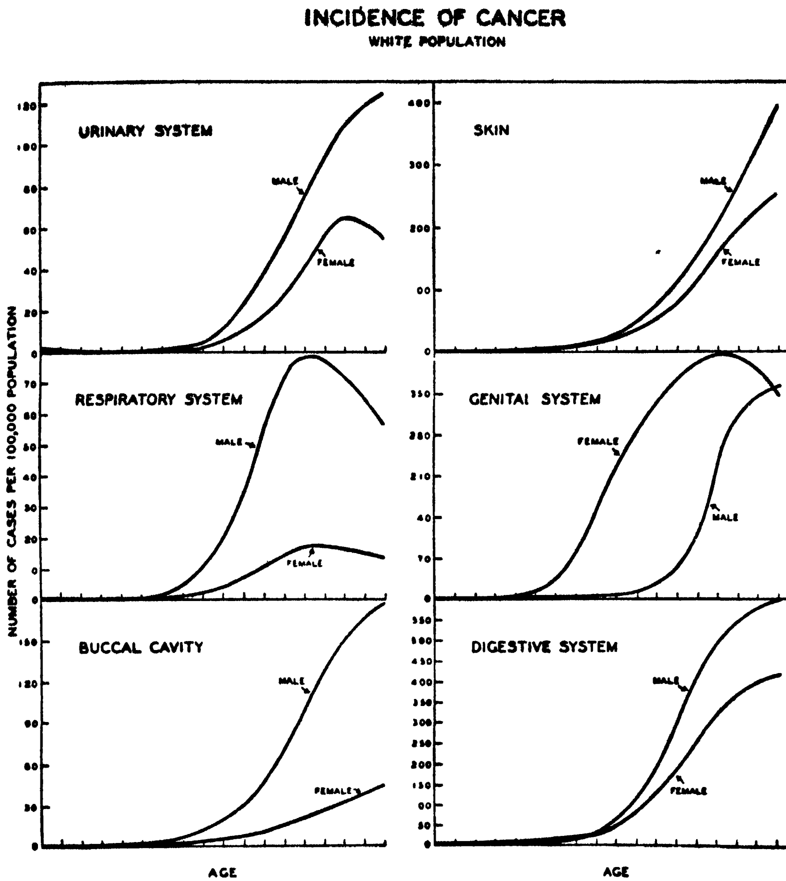


FIGURE 6.—Incidence rates of cancer for certain broad groups of primary sites, by age and sex for the white population.

VARIATIONS IN THE PRIMARY SITE OF CANCER BETWEEN WHITE AND COLORED PERSONS

Dermatologists and clinicians long have believed that light-skinned persons are more likely to develop cancer of the skin than are persons with more pigmentation. The illness rates shown in figure 7 support this belief; the difference between whites and nonwhites, however, is greater for males than for females. For males the prevalence rate for skin cancer among whites is about ten times that among nonwhites but for females the corresponding ratio is about six.

If, as has been suggested, the under-reporting of cancer among Negroes is greater than the under-reporting of cancer among whites, the difference in the prevalence of skin cancer in the two races is not as great as figure 7 indicates. It is not believed, however, that the difference in the relative number of persons with cancer who fail to

obtain medical care is great enough to change materially the general picture presented by figure 7. Moreover the ratio of the white to the colored rate is larger for cancer of the skin than for any other important form of cancer.

Cancer of the genital system is the only form of cancer which is as frequent among colored as among white persons. For each sex the rates are approximately equal. However, the separate genital organs are affected quite differently among females of the two races.

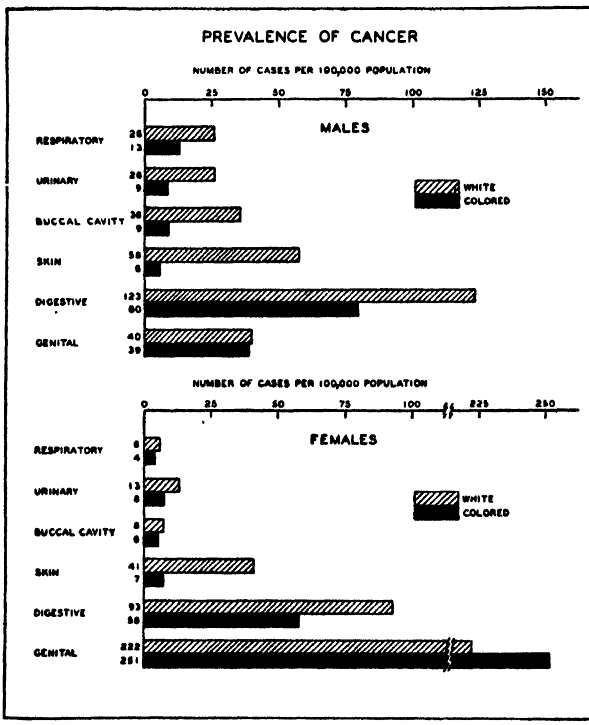


FIGURE 7.—Prevalence rates of cancer for separate primary sites by sex and color of population (standardized for age on the total urban population of the United States, 1940).

The rate for cancer of the uterus is 63 percent higher among colored than among white females. If, as some clinicians believe, cancer of the cervix is more likely to develop when lacerations and tears resulting from childbirth are not properly cared for, the greater prevalence of this form of cancer among Negro females may, in part at least, be due to this cause.

In 1939 the Bureau of the Census reported that about 20 percent of the births to colored mothers in cities of 10,000 or more population in the southern States where the cancer survey was conducted were delivered by midwives compared with about 3 percent of the births to white mothers. About one-half of the Negro and three-fourths of

the white babies were born in hospitals while the remainder were delivered at the mother's home by a physician. In northern cities less than 1 percent of white and colored babies are delivered by midwives. About 80 percent of white births and 64 percent of Negro births occur in hospitals; the remainder are delivered at home by physicians.

These figures suggest that, in the South, Negro mothers receive less adequate medical care at childbirth than do white mothers. It is also likely both in the South and in the North that when delivery occurs at home the mother does not receive as good postpartum medical care as when delivery occurs in a hospital.

Cancer of the genital organs other than uterus is relatively more frequent among white than among colored females. The prevalence rate for cancer of the breast is 50 percent higher and the rate for the other genital sites such as the vagina, vulva, and ovaries is 85 percent higher for white females.

VARIATIONS IN THE PRIMARY SITE OF CANCER BY AGE

Prevalence rates of cancer for broad groups of primary sites are shown in figures 8 and 9 by age for white males and females. The

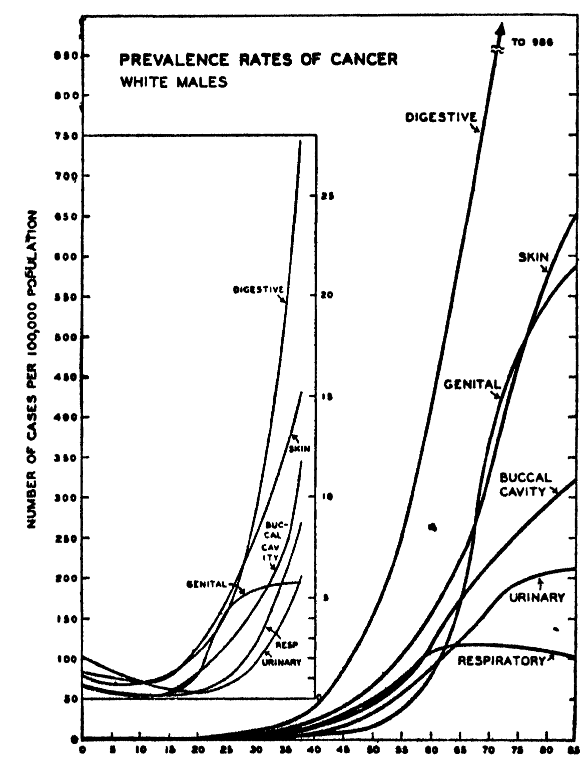


FIGURE 8.—Prevalence rates of cancer for separate primary sites by age for the white male population.

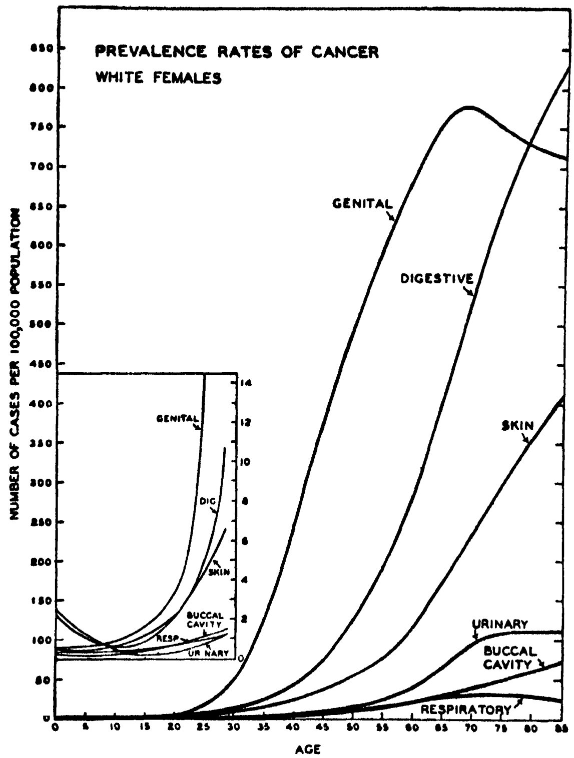


Figure 9.—Prevalence rates of cancer for separate primary sites by age for the white female population.

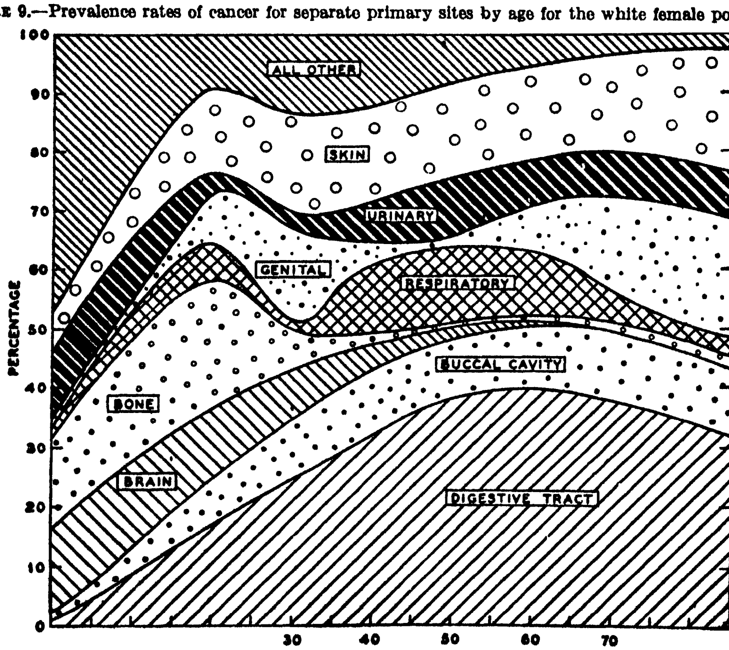


Figure 10.—Percentage distribution of the number of cases of cancer of different primary site groups at each age for white males (based on all cases under treatment).

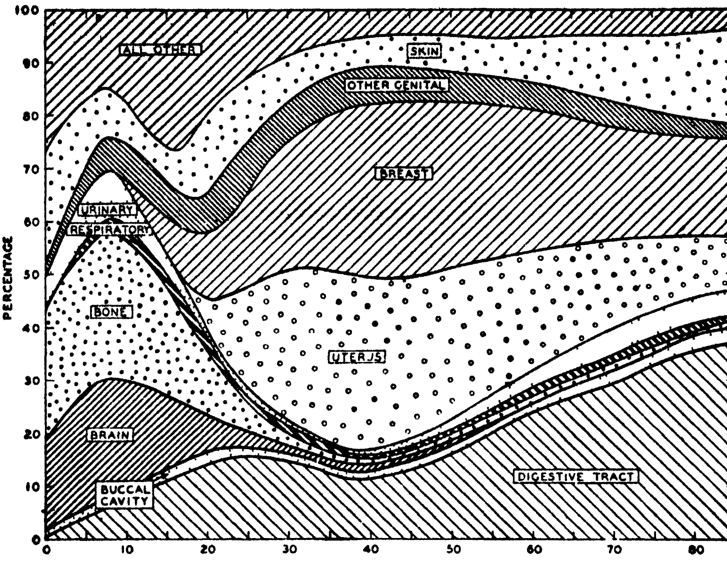


FIGURE 11.—Percentage distribution of the number of cases of cancer of different primary site groups at each age for white females (based on all cases under treatment)

figures emphasize the rapid rise in the prevalence of cancer with increasing age. For certain purposes it is desirable to consider the relative frequency of different primary sites at each age group independently of the frequency at other age groups. For this purpose figures 10 and 11 have been prepared to show the percentage distribution of cases of different primary sites for each age. From these figures it is apparent that cancers of the brain, bone, urinary system, and the "all other" group of sites which includes the glands account for a large proportion of the total number of cases of cancer among children and youth.

V. Illness from Cancer of Individual Specific Sites

THE RELATIVE IMPORTANCE OF CANCER OF INDIVIDUAL SPECIFIC SITES

About one-half (49 percent) of the white women receiving medical care for cancer are being treated for cancer of the breast and uterus; 26 percent are being treated for cancer of the breast and 23 percent for cancer of the uterus including both the cervix and fundus (fig. 12). Next in numerical importance as primary sites are the skin and the digestive tract, intestines, stomach, rectum, and anus.

The primary sites of cancer are more uniformly distributed among the various parts of the body for males than for females. More white males are being treated for cancer of the skin than for any other form of malignant growth, but this accounts for only about 17 percent of all cases of cancer and the rate is only a little more than one-half the rate for cancer of the breast in females (fig. 13). Except for

cancer of the prostate, which ranks next to cancer of the stomach and of the skin in order of frequency, cancer of the genital organs is relatively rare among males.

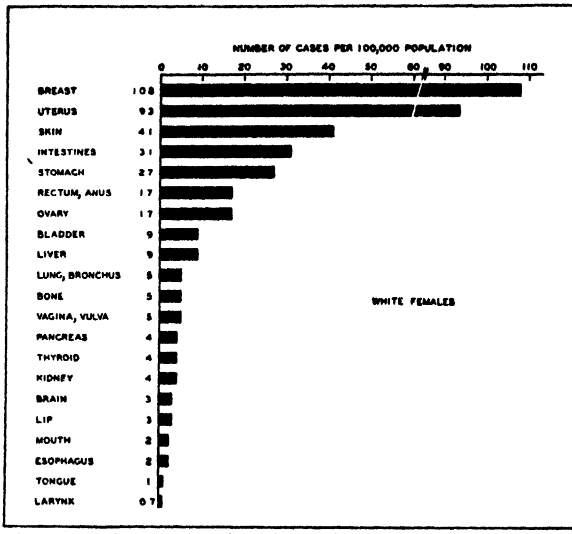


FIGURE 12 —Prevalence rates of cancer of specific primary sites, white female population (Rates are standardized for age using the total urban population of the United States, 1940, as standard)

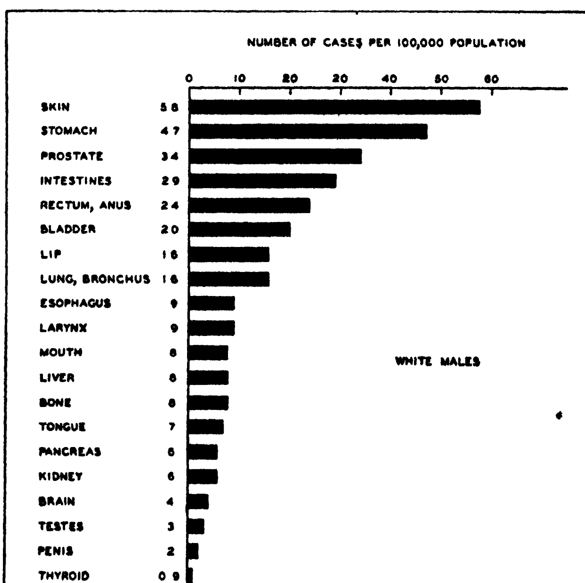


FIGURE 13 —Prevalence rates of cancer of specific primary sites, white male population (Rates are standardized for age using the total urban population of the United States, 1940, as standard)

VARIATION IN CANCER OF SPECIFIC PRIMARY SITES BY SEX AND AGE

Although the shape of the illness rate curve by age varies considerably by specific primary site, the male rate is generally higher than the

female rate except for cancer of the liver (fig. 14). As was pointed out above, cancer of the genital organs as a group is much more frequent among females than among males.

For certain sites such as the brain, kidney, lung, and pancreas, the illness rates do not continue to increase with age but reach a peak around 60 to 70 years of age and then decline. In general, the illness rates for males increase more rapidly with increasing age than do the rates for females so that the difference between the rates for the two sexes increases with age. There are, however, a few exceptions to this.

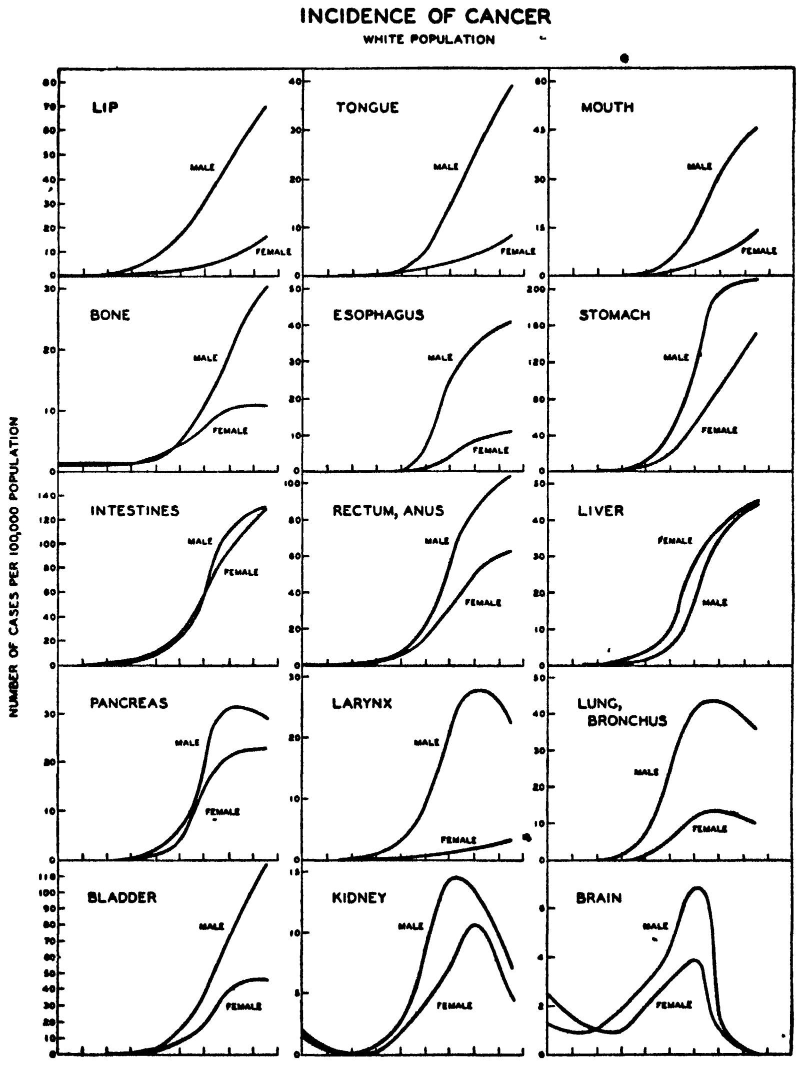


FIGURE 14.—Incidence rates of cancer of specific primary sites by age and sex of the white population.

Appendix—Continued

TABLE 4.—*Incidence rates of cancer per 100,000 white population by sex, age, and primary site, all regions combined*

Site and sex	Under 15	15–24	25–34	35–44	45–54	55–64	65–74	75 and over	All ages: Crude	All ages: Standardized[1]	Number of cases
Lip:											
Male	[2]—	1	3	8	19	27	46	69	9	10	534
Female	—	—	1	2	3	4	8	16	2	2	98
Tongue:											
Male	—	—	—	1	4	16	24	39	3	4	201
Female	—	—	—	—	2	3	4	8	1	1	49
Mouth:											
Male	—	—	—	1	6	16	33	45	4	5	242
Female	—	—	—	1	1	5	6	14	1	1	71
Esophagus:											
Male	—	—	—	—	7	24	35	41	5	5	280
Female	—	—	—	—	1	4	9	11	1	1	60
Stomach:											
Male	—	—	2	11	43	111	199	210	28	31	1,590
Female	—	—	1	7	20	56	90	148	15	16	867
Intestines:											
Male	—	—	2	8	22	58	111	131	15	17	886
Female	—	1	4	10	25	58	[illegible]	128	17	18	969
Rectum:											
Male	—	1	2	6	22	55	86	104	14	15	789
Female	—	—	3	5	17	31	52	62	9	10	543
Liver:											
Male	—	—	1	2	5	18	35	44	5	5	263
Female	—	—	1	4	10	28	37	45	7	7	377
Pancreas:											
Male	—	—	—	2	7	18	33	28	4	5	252
Female	—	—	—	1	3	15	22	22	3	3	182
Larynx:											
Male	—	—	1	3	9	22	30	18	5	5	291
Female	—	—	—	—	1	1	2	4	—	—	22
Lung, bronchus:											
Male	—	—	1	7	24	42	44	36	10	11	592
Female	—	—	1	1	6	12	14	10	3	3	157
Prostate: Male	—	—	1	1	9	48	200	336	18	22	1,020
Testes: Male	—	1	4	3	2	3	1	5	2	2	124
Penis: Male	—	—	—	—	1	3	9	17	1	1	59
Uterus: Female	—	1	18	69	130	152	161	121	52	54	2,984
Ovary, fallopian tubes Female	—	1	5	13	24	32	38	20	11	11	618
Vagina, vulva. Female	—	—	—	2	4	8	16	17	3	3	154
Breast: Female	—	1	16	70	126	179	198	185	56	58	3,237
Kidney:											
Male	1	—	1	2	8	15	14	7	4	4	207
Female	1	—	—	2	4	7	11	4	2	2	121
Bladder:											
Male	—	—	1	4	16	38	72	116	10	12	603
Female	—	—	1	1	8	17	42	44	5	6	308
Skin:											
Male	1	2	7	17	48	114	209	395	34	38	1,940
Female	1	2	6	18	40	72	152	254	26	28	1,530
Brain:											
Male	1	1	2	3	4	7	1	—	3	2	153
Female	2	1	1	2	3	4	1	—	2	2	102
Bone:											
Male	1	3	1	2	5	11	20	30	4	4	232
Female	1	1	1	3	4	8	11	10	3	3	163

[1] Standardized for age using the total urban population of the United States, 1940.
[2] A dash indicates a rate of less than 0.1.

TABLE 5.—*Incidence rates of cancer per 100,000 population by age, sex, color, and region*

Age	White						Colored			
	South		North		West		South		North	
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
Under 10	11.5	10.5	7.3	4.7	6.9	5.7	4.5	2.1	5.0	3.3
10-19	18.9	10.7	8.2	7.0	16.4	11.4	4.3	7.7	5.2	3.2
20-24	23.5	14.3	15.2	14.1	15.5	26.5	45.4	16.3	25.5	30.2
25-29	61.8	73.1	21.4	39.0	35.5	50.4	8.4	104.5	11.4	44.6
30-34	75.7	123.4	34.8	83.6	54.9	107.4	31.9	155.0	33.8	97.8
35-39	105.0	247.8	48.8	158.8	86.1	151.6	49.4	219.1	58.9	170.9
40-44	187.2	386.5	117.6	263.8	121.9	280.4	63.0	332.0	82.2	228.8
45-49	315.5	540.5	203.1	394.8	183.5	427.4	127.4	453.3	113.5	336.5
50-54	458.4	619.7	347.6	486.0	394.8	566.9	173.7	721.3	218.8	469.7
55-59	898.9	755.1	520.4	653.7	646.1	623.9	347.1	811.3	353.0	559.4
60-64	1,072.3	1,098.9	838.0	817.3	862.3	811.6	555.1	811.6	556.2	676.7
65-69	1,570.7	1,193.8	1,107.1	928.9	1,102.5	985.4	587.1	758.7	959.4	642.2
70-74	1,919.0	1,464.5	1,430.0	1,028.5	1,533.2	1,358.4	525.9	410.5	1,005.3	798.3
75 and over	2,305.7	1,501.7	1,559.7	1,000.5	2,163.6	1,687.4	534.2	556.7	844.0	638.6
All ages:										
Crude	243.1	277.3	176.7	213.7	265.0	311.2	74.8	186.4	95.3	150.9
Standardized [1]	301.7	313.6	203.1	230.1	232.8	262.7	111.6	250.7	141.1	196.0
Number of cases	1,860	2,225	7,588	9,136	1,827	2,192	194	555	356	597

[1] Standardized for age using the total urban population of the United States, 1940.

TABLE 6.—*Prevalence rates of cancer per 100,000 population by age, sex, color, and region*

Age	White						Colored			
	South		North		West		South		North	
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
Under 10	13.3	13.3	9.9	7.2	8.2	7.0	4.4	2.1	10.0	5.0
10-19	23.9	17.0	13.3	9.8	19.8	13.6	6.3	7.5	5.2	8.0
20-24	31.1	19.2	24.0	18.5	28.7	33.1	54.7	26.1	28.9	41.4
25-29	74.8	94.0	33.3	56.0	42.0	66.8	8.2	146.7	20.2	68.0
30-34	103.1	148.1	51.4	127.5	72.5	150.7	41.2	211.9	44.7	131.8
35-39	151.9	394.3	80.6	253.4	110.5	239.6	67.2	329.1	81.2	271.4
40-44	273.6	579.7	171.7	420.2	181.0	409.9	89.1	470.8	128.6	445.1
45-49	441.2	817.9	311.6	658.9	269.8	706.5	178.8	686.8	173.5	615.4
50-54	594.6	916.0	513.3	826.2	539.8	865.6	226.0	998.2	325.2	818.7
55-59	1,205.1	1,156.3	802.1	1,143.3	911.0	1,043.4	454.5	1,088.6	524.8	1,036.3
60-64	1,562.0	1,613.6	1,312.6	1,406.5	1,204.0	1,346.6	736.2	1,269.8	761.1	1,363.7
65-69	2,182.5	1,887.4	1,823.8	1,692.0	1,713.5	1,578.5	778.6	1,062.2	1,300.7	1,118.2
70-74	2,791.2	2,149.0	2,405.6	1,859.4	2,202.3	2,062.4	831.2	779.2	1,605.8	1,283.5
75 and over	3,919.6	2,237.2	2,801.1	2,108.1	3,249.0	2,692.2	803.9	901.6	1,283.5	792.2
All ages:										
Crude	346.2	418.6	281.5	369.2	381.6	490.9	101.1	270.0	138.9	261.9
Standardized [1]	433.7	468.3	327.1	399.6	335.6	413.6	152.3	364.6	205.8	341.2
Number of cases	2,649	3,359	12,088	15,783	2,631	3,458	262	804	519	1,036

[1] Standardized for age using the total urban population of the United States, 1940.

TABLE 7.—*Incidence rates of cancer per 100,000 white population by age, sex, and groups of primary sites for each region*

Site, region, and sex	Under 15	15–24	25–34	35–44	45–54	55–64	65–74	75 and over	All ages: Crude	All ages: Standardized [1]	Number of cases
BUCCAL CAVITY AND PHARYNX											
South:											
Male	(2)	5.3	12.5	29.9	68.6	124.1	169.7	227.7	33.3	39.8	255
Female	0.7	—	2.5	19.4	8.4	41.4	57.4	76.8	11.1	12.5	89
North:											
Male	0.1	0.4	1.8	7.0	21.3	58.8	116.5	176.4	15.7	18.4	675
Female	0.1	0.1	1.0	1.7	5.2	10.1	17.4	33.7	3.2	3.5	137
West:											
Male	0.9	—	6.3	17.7	41.8	79.4	122.7	137.4	28.4	24.8	196
Female	—	—	—	—	10.9	20.0	27.2	58.0	6.8	5.6	48
DIGESTIVE ORGANS AND PERITONEUM											
South:											
Male	1.1	1.5	8.7	23.7	62.0	246.0	332.0	450.6	47.6	59.5	364
Female	0.6	2.1	13.0	28.2	54.6	161.8	251.1	281.7	39.8	45.6	319
North:											
Male	0.4	1.6	7.3	30.2	117.3	293.3	537.0	553.7	72.9	83.3	3,130
Female	0.5	1.7	9.3	27.6	82.5	204.1	313.2	399.4	52.0	57.3	2,224
West:											
Male	0.8	1.0	8.4	31.7	88.7	280.8	489.7	655.4	90.4	78.7	623
Female	—	3.5	11.4	30.2	79.3	185.0	319.3	580.4	73.0	60.2	514
RESPIRATORY ORGANS											
South:											
Male	—	—	2.4	9.2	24.5	63.6	75.8	35.9	12.7	15.2	97
Female	—	—	—	2.0	8.5	13.2	3.9	—	2.4	2.7	19
North:											
Male	0.3	1.0	2.1	11.6	38.1	70.2	77.1	57.8	16.9	17.7	724
Female	0.1	0.1	0.9	1.7	7.0	14.7	18.7	12.9	3.5	3.8	148
West:											
Male	0.9	2.0	3.4	8.0	26.9	64.2	81.4	65.4	19.0	16.5	131
Female	0.9	—	1.6	0.9	6.2	14.3	18.7	22.2	4.7	4.0	33
UTERUS											
South: Female	—	1.4	25.3	109.8	183.9	219.1	199.1	153.1	68.5	76.2	550
North: Female	—	1.0	15.6	63.4	121.1	150.1	158.3	96.6	47.6	50.4	2,084
West: Female	—	0.9	20.7	59.9	127.0	108.7	143.9	195.9	56.8	49.3	400

BREAST											
South: Female	—	1.4	17.4	66.3	110.7	160.3	178.8	207.6	48.1	54.0	386
North: Female	0.1	1.4	16 0	71.8	127.7	180.2	196.3	148.9	54.7	58.1	2,337
West: Female	—	0.9	18.3	64.7	126.6	187.8	220.6	309.5	73.0	62.2	514
GENITAL ORGANS [3]											
South.											
Male	—	3.0	3.8	1.8	11.9	52 6	285.5	311.8	20.5	27.6	157
Female	—	2.8	47.6	185 5	332.3	421.4	438.8	417.0	129.6	144.9	1,040
North:											
Male	0.3	1 0	4.3	4 4	12.4	50.8	199.1	324.7	19.0	23.8	815
Female	0.4	3.3	36.9	151.2	272.3	370 6	403.2	278.3	114.5	121.5	4,596
West:											
Male	—	2.0	10 2	7 0	7 9	67 9	250.1	511.4	33.6	32.4	232
Female	—	6.5	45.7	140.2	300.2	337.4	438 2	544.9	150.6	129.7	1,061
URINARY ORGANS											
South:											
Male	1.7	—	0.8	6 4	23 0	51 7	59 0	106.3	11.2	13.8	86
Female	1.7	—	2.8	4.3	11.8	27 5	67.7	105.2	9.3	10.8	75
North:											
Male	0.7	0.1	1.8	5.8	24 9	56.7	95.6	121 4	14.4	16.4	690
Female	0.2	—	1.1	2.4	12.6	25.7	53.2	43.6	7.1	7.9	304
West:											
Male	—	1.0	2.5	5.2	23.4	41 9	69 0	149.3	16.2	14.3	112
Female	2.6	—	1.6	4.5	11 4	18.6	62.9	44.2	10.1	8.5	71
SKIN											
South:											
Male	—	2.9	29.6	50.2	153 7	357 0	658.9	1,054.0	92.8	116.4	710
Female	2.2	4.7	21.7	50 6	112.2	123.4	424.4	605.3	66.5	70.5	534
North:											
Male	0.8	1.8	3.7	10 1	27.5	68 5	129.5	242 2	19 8	23.1	850
Female	0.4	1.8	3.2	10.6	25.8	50.6	94.3	171.2	16.5	18.2	707
West:											
Male	1.1	2.4	3.1	21.8	72.1	149 0	226.7	553.2	55.1	48.5	380
Female	1.1	2.3	8.2	26.9	49.2	69.7	192.0	324.4	41.0	34.2	289

[1] Standardized for age using the total urban population of the United States, 1940.
[2] A dash indicates a rate of less than 0.1.
[3] Rates for females include breast and uterus.

CULTIVATION OF *PASTEURELLA TULARENSIS* IN A LIQUID MEDIUM [1]

By EDWARD A. STEINHAUS, *Associate Bacteriologist*, R. R. PARKER, *Director*, and MAX T. MCKEE, *Junior Bacteriologist, United States Public Health Service*

It has been generally accepted until recently that *Pasteurella tularensis* could not be grown in liquid media. However, cultivation in such media was reported in April 1943 by Tamura and Gibby (*1*) who used gelatin, casein hydrolysates, or amino acids supplemented with certain accessory factors.

The purpose of the present paper is to report another liquid medium, simple and practical, which the authors have used successfully for the past year for the cultivation of this bacterium. The formula is as follows:

A.	Bacto-heart infusion broth (dehydrated)	32 gm.
	(Infusion made from beef heart, 500 gm.; proteose peptone, 10 gm.; and sodium chloride, 5 gm. per liter.)	
	Dextrose	10 gm.
	Cystine	1.5 gm.
B.	Bacto-hemoglobin	5 gm.

In preparing this medium a double strength broth is prepared by dissolving the ingredients of A in 500 ml. of distilled water. This is easily accomplished by steaming a few minutes. The pH is adjusted to 7.8 and the solution sterilized at 121° C. for 15 minutes in a 2-liter flask with dispensing unit attached. The final pH is between 7.0 and 7.4.

The hemoglobin (B) is first made into a uniform paste and then dissolved in 500 ml. of distilled water and strained through gauze to remove any large particles. This solution is then sterilized at 121° C. for 15 minutes.

These two sterile preparations (A and B) are cooled to 50° to 60° C., thoroughly mixed, and dispensed into sterile test tubes under strictly aseptic conditions. The dispensing flask should be agitated frequently to keep the hemoglobin suspended.

Care must be taken to have all or most of the cystine go into solution. A medium in which the cystine settles to the bottom of the tubes is not satisfactory.

EXPERIMENTAL

Original inoculations into the liquid medium were made from fresh cultures on cystine heart agar slants. Subsequent transfers to fresh liquid medium were made with a regular bacteriologic loop or a capillary pipette. Controls of cystine heart agar and plain nutrient agar were used with each transfer. After three transfers small amounts of the culture were inoculated into guinea pigs.

Ten strains of *P. tularensis* from the following sources have been cultivated in this medium: Three from water (isolated via guinea pigs), three from human cases, three from ticks (*Dermacentor andersoni*), and one from a muskrat (*Ondrata zibethica*).

---

[1] Contribution from the Rocky Mountain Laboratory (Hamilton, Mont.) of the Division of Infectious Diseases, National Institute of Health.

Most of the strains tested grew well in the liquid medium with a light but definite turbidity usually resulting in 48 hours, although with some the turbidity resulting from the initial transfer was delayed 3 or 4 days. When large inocula were used, the broth frequently became turbid within 20 to 24 hours, and a greater final turbidity usually resulted. Transfers to fresh liquid media were usually made 1 or 2 days after turbidity was apparent and successful serial transfers were effected using in some cases as small an inoculum as one loop of turbid culture.

Microscopic examinations of cultures showed cells of typical morphology for *P. tularensis*.

The reaction of guinea pigs inoculated subcutaneously with 0.5 ml. of culture after the third transfer indicated that no decrease in the virulence of the organisms had taken place.

SUMMARY

An easily prepared liquid medium for the serial cultivation of *Pasteurella tularensis* is described. Strains from water, muskrats, ticks, and human beings have been cultivated in this medium.

REFERENCE

Tamura, J. T., and Gibby, I. W.: Cultivation of *Bacterium tularense* in simplified liquid media. J. Bact., **45**: 361-371 (1943).

PREVALENCE OF COMMUNICABLE DISEASES IN THE UNITED STATES

December 5, 1943–January 1, 1944

The accompanying table summarizes the prevalence of nine important communicable diseases, based on weekly telegraphic reports from State health departments. The reports from each State are published in the Public Health Reports under the section "Prevalence of disease." The table gives the number of cases of these diseases for the 4 weeks ended January 1, 1944, the number reported for the corresponding period in 1942, and the median number for the years 1938–42.

DISEASES ABOVE MEDIAN PREVALENCE

Influenza.—The number of reported cases of influenza rose from 10,238 for the 4 weeks ended December 4 to 317,151 for the 4 weeks ended January 1, 1944. The weekly numbers of reported cases increased from 23,746 for the week ended December 11 to 126,481 and 126,610 for the weeks ended January 1 and January 8, respectively. The total number of cases for the current 4-week period compares

with 10,734 for the corresponding period in 1942 and with a preceding 5-year median of 11,034 cases.

The accompanying table shows by geographic areas the reported cases of influenza for recent weeks in 1943–44 and corresponding weeks in preceding years. The first sign of the current epidemic appeared in Michigan, in the East North Central region, during the week ended November 13 and within the next 3 weeks (ended December 4) it had spread into all sections of the country except the Pacific Coast. During the week ended December 11 the cases increased very rapidly in all regions and by the end of the next week (ended December 18) the Pacific region also reported a very significant increase over the preceding week as well as over 2 preceding years. In all regions except the Mountain and Pacific the cases reported have been higher than in the 3 preceding years; the minor epidemic of 1940–41 began in the Mountain and Pacific regions about the first week of December 1940. During the week ended January 1, 1944, the Middle Atlantic, West North Central, Mountain, and Pacific regions reported fewer cases than were reported during the preceding week and the New England and Middle Atlantic regions reported only slight increases. While the number of reported cases for the week ended January 8, the last available data at this time, was practically the same as in the preceding week, the West South Central region was the only one which increased, the other eight regions all showing decreases over the week ended January 1. Of 45 States reporting for both weeks, 28 States reported fewer cases for the week ended January 8 than for the preceding week. Considering this comparison by geographic sections: of 7 New England and Middle Atlantic States reporting, 6 reported fewer cases for the week ended January 8 than January 1; of 12 East and West North Central States, 8 reported fewer cases for January 8; of 11 South Atlantic and East South Central States, 6 reported fewer cases; of 11 Mountain and Pacific States, 7 reported fewer cases; and of 4 West South Central States, 1 reported fewer cases. Thus the majority of the States have passed the peak of reported cases in every region except the West South Central.

The most reliable index of the extent of the influenza epidemic is mortality, particularly mortality from influenza and pneumonia. However, influenza and pneumonia are about the only causes that give rise to any sudden increase in the death rate from all causes throughout the country; therefore, the excess deaths from all causes over some normal period are a good index of the mortality associated with the epidemic.

The reports of total deaths from 90 large cities which are received telegraphically and published by the Bureau of the Census in the Weekly Mortality Index afford up-to-date data on excess deaths. In table 2 these 90 cities have been classified according to geographic

section and excess rates computed for each region. The rates as here computed represent excesses for current weeks over an average based on corresponding weeks of the 2 preceding years.

It is seen in table 2 that the excess mortality reached a peak in the week ended January 1, 1944, of 6.4 per 1,000 population (annual basis), which is 50 percent above the expected figure of 12.9 per 1,000. The peak in the excess rates ranged from highs of 8.3 per 1,000 in the

TABLE 1.—*Influenza cases reported by geographic regions by weeks in 1943 and 1944 and for the corresponding weeks in preceding years* [1]

Geographic area and years	Week ended [2]									
	1943								1944	
	Nov. 6	Nov. 13	Nov. 20	Nov. 27	Dec. 4	Dec. 11	Dec. 18	Dec. 25	Jan. 1	Jan. 8
46 States,[3] District of Columbia, and New York City:										
1943-44	1,429	1,555	1,734	2,465	4,484	23,746	82,951	83,973	126,481	126,610
1942-43	1,576	1,596	1,769	1,854	1,928	2,604	2,414	2,290	3,440	3,852
1941-42	1,553	2,308	2,372	2,469	2,478	2,742	2,995	2,693	2,587	3,800
1940-41	976	787	1,180	1,332	3,014	9,663	29,864	42,457	45,475	77,144
New England:										
1943-44	3	1	3	32	54	121	344	929	1,019	560
1942-43	5	16	4	7	9	3	4	3	11	63
1941-42	1	1	-------	2	3	2	7	1	1	9
1940-41	1	6	1	4	5	4	13	8	25	149
Middle Atlantic:										
1943-44	14	7	24	11	36	133	564	889	526	225
1942-43	22	37	20	25	81	31	23	25	42	51
1941-42	8	6	16	11	19	15	21	20	27	26
1940-41	14	6	11	4	6	9	23	45	38	97
East North Central:										
1943-44	32	163	36	41	122	930	5,620	10,236	11,132	8,959
1942-43	63	50	68	64	50	69	114	55	103	123
1941-42	45	60	105	65	75	79	71	72	88	148
1940-41	57	43	67	56	81	133	305	1,058	358	396
West North Central:										
1943-44	6	8	17	432	431	7,398	6,639	14,087	7,647	5,749
1942-43	8	24	15	8	30	42	51	40	18	125
1941-42	13	21	36	15	23	35	63	26	33	65
1940-41	8	10	7	17	19	30	76	336	1,867	2,771
South Atlantic:										
1943-44	428	446	507	649	1,227	4,035	15,920	16,425	35,971	32,635
1942-43	539	637	674	811	559	1,042	798	691	1,224	1,561
1941-42	407	434	534	529	624	727	732	664	515	979
1940-41	425	259	500	325	453	632	864	779	1,706	4,308
East South Central:										
1943-44	96	70	86	111	428	6,007	35,425	4,775	29,266	28,945
1942-43	64	52	88	45	90	123	85	217	237	197
1941-42	49	60	97	100	142	101	165	98	121	251
1940-41	22	59	92	76	69	67	195	458	1,710	11,536
West South Central:										
1943-44	669	705	815	971	1,546	3,633	9,029	15,652	25,686	37,332
1942-43	657	626	681	631	907	1,017	995	967	1,465	1,419
1941-42	859	1,482	1,350	1,547	1,306	1,474	1,661	1,517	1,455	1,906
1940-41	327	272	285	210	416	773	1,763	12,796	19,516	44,982
Mountain:										
1943-44	142	137	224	179	579	1,393	5,975	11,911	7,774	7,169
1942-43	171	102	156	200	201	206	276	245	289	262
1941-42	110	123	148	146	193	198	164	177	269	285
1940-41	92	108	67	150	390	780	11,600	8,455	9,566	7,581
Pacific										
1943-44	39	18	22	39	61	96	3,435	9,069	7,460	5,036
1942-43	47	52	63	63	51	71	68	47	51	51
1941-42	61	121	91	54	93	111	111	118	78	131
1940-41	30	24	150	490	1,575	7,235	15,025	18,522	10,689	5,324

[1] A similar table appeared in the Public Health Reports for Dec. 24, 1943, p. 1893, with data from Sept. 26 to Dec. 11, inclusive.

[2] First week of year is the one ended Jan. 4 to 10, inclusive, with corresponding weeks counted from this base.

[3] New York State and Mississippi excluded.

South Atlantic region, 8.1 in the Middle Atlantic, and 7.8 in the New England, to lows of 5.0 in the Mountain, 5.2 in the West North Central, and 5.3 in the East North Central regions. The above peaks all occurred in the week ended January 1; the rate for that week was 3.3 in the Pacific region, which was the last to be affected and which had a

TABLE 2.—*Weekly actual and excess death rates from all causes per 1,000 estimated population in 90 cities in different geographic sections of the United States, Nov. 7, 1943–Jan. 8, 1944*[1]

Geographic section	Week ended: November 13	November 20	November 27	December 4	December 11	December 18	December 25	January 1	January 8
	Excess[2] death rate from all causes per 1,000 (annual basis)								
All cities	−0.1	+0.4	−0.2	+1.4	+1.7	+3.5	+4.7	+6.4	+4.5
New England	+.9	+.4	−.3	+1.4	+1.3	+3.0	+5.3	+7.8	+7.2
Middle Atlantic	−.3	+.5	+.1	+1.5	+2.3	+4.3	+7.4	+8.1	+5.2
East North Central	−.2	0	+.1	+1.1	+1.8	+2.9	+3.0	+5.3	+4.1
West North Central	0	+1.1	−.8	+1.9	+2.6	+7.2	+4.9	+5.2	+2.4
South Atlantic	−.7	−1.1	−.3	+1.6	+1.3	+3.4	+4.4	+8.3	+2.7
East South Central	+2.8	+1.2	−1.1	+2.2	+1.3	+3.1	+1.7	+5.8	+4.2
West South Central	−1.7	+.8	+.9	+1.1	+1.1	+1.5	+2.8	+5.3	+3.7
Mountain	+.4	+1.5	+1.2	+1.3	+2.3	+5.6	+3.8	+5.0	+1.8
Pacific	+.9	+1.5	−1.3	+.8	+.3	+.9	+1.9	+3.3	+4.5
	Death rate from all causes per 1,000 (annual basis)								
All cities:									
1943–44	11.5	12.1	11.7	13.3	13.9	15.5	17.1	19.3	17.9
1941–42[3]	11.6	11.7	11.9	11.9	12.2	12.0	12.4	12.9	13.5
New England:									
1943–44	13.5	13.2	12.7	14.3	14.3	16.5	19.5	22.7	22.4
1941–42[3]	12.6	12.8	13.0	12.9	13.0	13.5	14.2	14.9	15.2
Middle Atlantic:									
1943–44	11.1	11.9	11.8	13.3	14.4	16.2	19.4	20.6	18.4
1941–42[3]	11.4	11.4	11.7	11.8	12.1	11.9	12.0	12.5	13.2
East North Central:									
1943–44	10.3	10.6	10.8	11.8	12.6	13.6	14.0	16.7	16.1
1941–42[3]	10.5	10.6	10.7	10.7	10.8	10.7	11.0	11.4	12.0
West North Central:									
1943–44	11.8	13.0	11.4	14.1	15.1	19.2	17.6	18.4	16.4
1941–42[3]	11.8	11.9	12.2	12.2	12.5	12.0	12.7	13.2	14.0
South Atlantic:									
1943–44	11.6	11.1	12.1	13.9	14.1	16.2	18.0	22.1	17.0
1941–42[3]	12.3	12.2	12.4	12.3	12.8	12.8	13.6	13.8	14.3
East South Central:									
1943–44	14.4	12.7	11.2	14.5	14.0	15.0	14.3	19.3	19.1
1941–42[3]	11.6	11.5	12.3	12.3	12.7	11.9	12.6	13.5	14.9
West South Central:									
1943–44	10.4	12.8	13.0	13.1	13.7	14.3	15.9	19.4	17.4
1941–42[3]	12.1	12.0	12.1	12.0	12.6	12.8	13.1	13.5	13.7
Mountain:									
1943–44	12.3	13.5	13.8	14.9	16.5	19.7	17.6	19.7	17.0
1941–42[3]	11.9	12.0	12.6	13.6	14.2	14.1	13.8	14.7	15.2
Pacific:									
1943–44	13.8	14.8	12.1	14.4	14.4	14.7	16.0	18.0	20.2
1941–42[3]	12.9	13.3	13.4	13.6	14.1	13.8	14.1	14.7	15.7

[1] Computed from data in Weekly Mortality Index of the U. S. Bureau of the Census.
[2] Excess over 3-week moving average of average of rates for corresponding weeks of 1941–42 and 1942–43.
[3] Three-week moving average of average of rates for corresponding weeks of 1941–42 and 1942–43.

higher excess rate in the week ended January 8, 4.5 per 1,000. In every other region the excess for the week ended January 8 was less than in the preceding week. In the New England cities the rate for the week of January 8 was only slightly below that of January 1, but in every other region the week of January 8 shows a considerable decrease. The South Atlantic cities dropped from an excess of 8.3 to only 2.7 per 1,000.

As compared with preceding epidemics, the present mortality from all causes is slightly greater than that which occurred in the epidemic of 1928–29 in which the peak excess rate in a group of large cities was 5.8 per 1,000 as compared with 6.4 in the present epidemic Although the 1928–29 epidemic was the largest of the 15 that have occurred since 1920, the mortality of that epidemic and of the present one is far below the 1918 pandemic when there was a peak excess rate from all causes of 52.5 per 1,000 population and in 1920 when there was a peak excess of 16.1 per 1,000, as compared with 6.4 in the present epidemic. The first cases in the present epidemic were reportedly so mild that almost no mortality was expected, but the figures in table 2 indicate that considerable mortality has occurred.

It should be remembered that all of the above figures refer to mortality from all causes. In the 1928–29 epidemic, 37 percent of the excess mortality from all causes was charged primarily to causes other than influenza and pneumonia. Most of these deaths from other causes were from chronic diseases, and their distribution by weeks included a peak which came at the same time as the influenza peak. They appear, therefore, to represent largely mortality that occurred at the particular time of the epidemic and because of influenza and pneumonia, although other important causes may have existed previously and a death may have been assigned as due primarily to that prior cause.

Meningococcus meningitis.—The number of cases of meningococcus meningitis rose from 967 during the 4 weeks ended December 4 to 1,389 cases during the 4 weeks ended January 1, 1944. Compared with preceding years the incidence of this disease continued at a relatively high level, the number of cases for the current period being almost 3 times the number reported for the corresponding period in 1942 and almost 10 times the 1938–42 median.

Each section of the country has contributed to the high incidence of meningococcus meningitis that has prevailed since the latter part of 1942. However, during the current period the largest increases over the 1938–42 median were reported from the Atlantic and Pacific Coast regions and the North Central region. In the New England, Middle Atlantic, and Pacific regions the numbers of cases (116, 401, and 137, respectively) were approximately 13 times the respective medians; in the East North Central region the incidence

(324 cases) was more than 20 times the median, and in the West North Central the number of cases (121) was 11 times the normal seasonal incidence.

After reaching a relatively high peak in 1936, meningitis declined rapidly until the beginning of 1941; since then the disease has been more prevalent. Preliminary figures indicate that there will be approximately 18,000 cases reported for the year 1943, the highest on record for this disease. The rate of increase during the last 4-week period over the preceding 4-week period (44 percent) was considerably larger than the normal seasonal expectancy. However, this rise may be compared with a corresponding increase in 1942 when the present epidemic was in progress; in that year the increase during the last 4-week period over the preceding period was 55 percent. Thus the rise in 1943 is not as sharp as it was a year ago.

TABLE 3.—*Number of reported cases of nine communicable diseases in the United States during the 4-week period December 5, 1943–January 1, 1944, the number for the corresponding period in 1942, and the median number of cases reported for the corresponding period 1938-42*

Division	Current period	1942	5-year median	Current period	1942	5-year median	Current period	1942	5-year median
	Diphtheria			Influenza [1]			Measles [2]		
United States	1,100	1,258	1,830	317,151	10,734	11,034	29,658	18,855	18,196
New England	54	18	28	2,413	21	21	2,081	3,661	1,900
Middle Atlantic	127	131	173	2,112	121	113	5,849	6,233	3,699
East North Central	128	168	260	27,918	341	337	11,217	1,655	1,655
West North Central	110	88	94	35,771	151	300	3,380	1,100	1,409
South Atlantic	177	261	516	72,351	3,755	3,755	3,805	226	922
East South Central	108	136	212	75,473	662	803	704	224	324
West South Central	223	272	384	54,000	4,444	4,444	458	434	470
Mountain	47	68	75	27,053	1,002	1,002	1,300	2,464	1,384
Pacific	126	116	115	20,060	237	418	864	2,858	2,795
	Meningococcus meningitis			Poliomyelitis			Scarlet fever		
United States	1,389	485	143	266	214	251	12,291	10,979	11,821
New England	116	68	9	16	5	5	1,217	1,390	858
Middle Atlantic	401	109	33	33	18	18	2,252	2,122	2,525
East North Central	324	54	16	30	18	23	2,913	3,114	3,722
West North Central	121	21	11	17	19	19	1,543	1,190	1,352
South Atlantic	139	97	25	11	15	24	1,125	1,080	1,148
East South Central	63	11	18	10	10	13	481	479	730
West South Central	55	23	13	32	75	20	392	315	388
Mountain	33	31	8	30	15	9	853	640	500
Pacific	137	71	10	87	39	24	1,515	649	650
	Smallpox			Typhoid and paratyphoid fever			Whooping cough [2]		
United States	32	112	220	324	251	426	7,234	11,979	13,465
New England	0	0	0	16	16	16	470	1,826	1,582
Middle Atlantic	0	34	0	32	25	63	1,320	3,266	3,801
East North Central	6	44	48	30	30	65	1,528	3,076	3,510
West North Central	10	10	107	7	27	26	396	559	541
South Atlantic	3	4	3	39	39	80	1,544	898	1,126
East South Central	3	4	3	104	32	32	548	391	391
West South Central	7	14	16	43	48	84	587	740	456
Mountain	3	2	9	14	21	26	302	831	893
Pacific	0	0	11	39	13	20	544	892	892

[1] Mississippi and New York excluded; New York City included.
[2] Mississippi excluded.

Measles.—The number of reported cases (29,658) of measles was about 60 percent above the 1938–42 median incidence for this period. In the East North Central region the number of cases (11,217) was 6.8 times the median; in the South Atlantic section the incidence (3,805 cases) was more than 4 times the median and minor excesses occurred in the North Atlantic, West North Central, and East South Central regions. In the West South Central, Mountain, and Pacific regions the incidence was below normal, the number of cases in the Pacific region being less than 30 percent of the 1938–42 median.

Poliomyelitis.—The number of cases of poliomyelitis dropped from 755 during the preceding 4-week period to 266 during the 4 weeks ended January 1, 1944. For the country as a whole the current incidence was about 25 percent above that of the corresponding period in 1942, but it was only slightly above the 1938–42 median. A comparison of geographic regions shows that the number of cases was above the median in every section except the West North Central, South Atlantic, and East South Central regions. Approximately 12,400 cases of poliomyelitis were reported during the year 1943; this was the highest number of cases reported during any year since 1931 which had a total of approximately 16,000 cases.

Scarlet fever.—The incidence of scarlet fever was slightly above the normal seasonal level, 12,291 cases being reported for the current 4-week period, as compared with the 1938–42 median of 11,821 cases. The Mountain and Pacific regions appeared to be mostly responsible for the current excess; in the former section the number of cases was 1.7 times the median while in the latter region the incidence was 2.3 times the median. Other regions reported only slight increases and four regions reported a decline from the median incidence.

DISEASES BELOW MEDIAN PREVALENCE

Diphtheria.—The incidence of diphtheria reached a new low level for this season of the year. For the 4 weeks ended January 1, 1944, there were 1,100 cases reported, as compared with 1,258 in 1943 and a median of 1,830 cases for the corresponding period in 1938–42. In the New England region the number of cases (54) was 3 times the 1943 figure for this period and almost twice the median, and a few more cases than might normally be expected were reported from the West North Central and Pacific regions; in all other regions the incidence was relatively low. Preliminary reports indicate that the total number of cases reported for the year 1943 may be the lowest on record.

Smallpox.—For the current period there were 32 cases of smallpox reported, as compared with 112, 70, and 220 for the corresponding period in 1942, 1941, and 1940, respectively. The 1938–42 median was 220 cases. Ten of the total cases were reported from the West North Central region and 7 from the West South Central region; the

remaining cases were widely distributed over other regions of the country.

Typhoid and paratyphoid fever.—For the 4 weeks ended January 1 there were 324 cases of these diseases reported. About one-fourth of the total cases were reported from Mercer County, Kentucky (82 cases), during the week ended January 1. Due largely to the high incidence in that State and to a rather large number of cases reported from California (26 cases) during the week ended December 11, the current incidence was 1.3 times the number reported for the corresponding weeks in 1942. The incidence was, however, only about 75 percent of the 1938–42 median.

Whooping cough.—The number of reported cases (7,234) of whooping cough was about 60 percent of the 1942 figure for this period and about 55 percent of the 1938–42 median incidence. Of the nine geographic regions, the South Atlantic, East South Central, and West South Central reported excesses over the median, but in each of the other six regions the incidence was below the normal seasonal expectancy.

MORTALITY, ALL CAUSES

For the four weeks ended January 1, 1944, there were approximately 48,900 deaths from all causes in the group of large cities reporting to the Bureau of the Census, an increase of approximately 48,400 deaths over the preceding 4-week period. Since the rise in mortality which began in the week ended December 5 following a sharp increase in the reported cases of influenza, the weekly number of deaths in large cities for the 5 weeks has exceeded the average for the corresponding week of the 3 preceding years by 9.4, 17.0, 27.5, 44.7, and 50.4 percent, respectively. A further discussion of mortality in large cities is found under the subject of influenza.

DEATHS DURING WEEK ENDED JANUARY 8, 1944

[From the Weekly Mortality Index, issued by the Bureau of the Census, Department of Commerce]

	Week ended Jan. 8, 1944	Corresponding week, 1943
Data from 86 large cities of the United States:		
Total deaths	12,950	10,404
Average for 3 prior years	9,851	
Deaths under 1 year of age	673	719
Average for 3 prior years	641	
Data from industrial insurance companies:		
Policies in force	66,216,002	65,276,406
Number of death claims	13,706	12,754
Death claims per 1,000 policies in force, annual rate	10.8	10.2

PREVALENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED JANUARY 15, 1944

Summary

The number of reported cases of influenza declined during the week from 126,610 to 65,649. Decreases were recorded in all geographic areas, although increases were recorded in 5 States, the largest increase being in Louisiana, which State reported 6,430 cases as compared with 4,106 for the preceding week. A decline was also recorded in both the total mortality for 90 large cities and in mortality from influenza and pneumonia combined for 34 scattered cities. Urban mortality was reported for the weeks ended January 8 and 15, respectively, as follows: Total, all causes, in 90 large cities, 13,322 and 11,538; mortality from influenza and pneumonia in 34 scattered cities (including several smaller cities), 973 and 683. For the peak week for mortality, week ended January 1, the number of deaths in the 90 cities was 50.4 percent above the 3-year average. This is the greatest winter excess in total urban mortality since the influenza epidemic of 1928–29. Estimating that the population of this group of cities increased 1 or 2 percent during the past 2 years, it may be assumed that a similar increase could normally have been expected in the death rate.

The incidence of meningococcus meningitis increased for the fourth successive week. A total of 645 cases was reported currently (more than for any week last year and for any prior week of record), as compared with 309 and 251 for the corresponding week in 1943 and 1930, respectively, the largest numbers previously recorded for the corresponding weeks of record.

Of the current total 401 cases, or 62 percent, occurred in 11 States reporting more than 20 cases each, as follows (last week's figures in parentheses): *Increases*—Massachusetts 34 (24), New York 89 (75), New Jersey 32 (31), Michigan 22 (11), Missouri 25 (18), Virginia 21 (20), and California 42 (36); *decreases*—Pennsylvania 41 (48), Ohio 47 (50), Illinois 27 (35), and Tennessee 21 (29). Reports of 10 or more cases each in 13 other States aggregated 185 cases.

For the first 2 weeks of the year, as compared with the same period last year, increased incidence is reported for dysentery, infectious encephalitis, measles, scarlet fever, and typhoid fever, while for diphtheria, poliomyelitis, smallpox, tularemia, endemic typhus fever, and whooping cough the reported incidence is less.

Telegraphic morbidity reports from State health officers for the week ended January 15, 1944, and comparison with corresponding week of 1943 and 5-year median

In these tables a zero indicates a definite report, while leaders imply that, although none was reported, cases may have occurred.

Division and State	Diphtheria			Influenza			Measles			Meningitis, meningococcus		
	Week ended—		Median 1939–43	Week ended—		Median 1939–43	Week ended—		Median 1939–43	Week ended—		Median 1939–43
	Jan. 15, 1944	Jan. 16, 1943		Jan. 15, 1944	Jan. 16, 1943		Jan. 15, 1944	Jan. 16, 1943		Jan. 15, 1944	Jan. 16, 1943	
NEW ENGLAND												
Maine	1	0	0	28	---	3	110	16	70	3	19	0
New Hampshire	0	0	0		---	------	3	173	8	0	0	0
Vermont	0	0	0	28	-----	------	4	304	14	0	0	0
Massachusetts	3	2	2		-----	------	358	450	441	34	12	3
Rhode Island	2	2	1	13	-----	------	154	9	9	4	20	0
Connecticut	5	0	0	158	4	4	37	358	161	17	4	1
MIDDLE ATLANTIC												
New York	9	16	24	[1] 28	[1] 22	[1] 22	873	852	852	89	23	5
New Jersey	2	8	7	85	26	24	40	331	112	32	8	1
Pennsylvania	10	19	19	28	2	---		1,841	1,463	41	16	4
EAST NORTH CENTRAL												
Ohio	12	15	15	4,212	14	35	1,824	61	61	47	0	1
Indiana	14	12	14	129	8	25	189	152	31	14	2	1
Illinois	5	7	28	67	11	21	298	176	89	27	3	3
Michigan [2]	3	7	7	61	5	5	1,091	135	384	22	3	1
Wisconsin	1	6	1	1,297	147	61	947	437	437	12	2	0
WEST NORTH CENTRAL												
Minnesota	2	4	4	3	2	2	760	14	177	11	0	0
Iowa	12	10	10	1,839	-	4	100	44	134	1	0	0
Missouri	1	5	7	40	10	18	43	46	40	25	25	1
North Dakota	3	0	0	301	46	42	337	8	11	1	0	0
South Dakota	2	1	2	-----	---	--	114	162	9	1	1	0
Nebraska	1	7	3	60	28	--	6	140	11	1	1	0
Kansas	3	4	7	844	4	16	65	68	141	7	8	0
SOUTH ATLANTIC												
Delaware	1	0	0	-	--		13	2	2	1	0	0
Maryland [2]	6	12	6	876	22	22	126	10	12	11	10	1
District of Columbia	0	1	3	62	4	4	31	13	8	1	4	0
Virginia	7	11	11	7,721	489	489	277	79	141	21	20	3
West Virginia	5	8	9	3,394	14	14	266	7	54	18	1	0
North Carolina	15	11	22	158	17	17	297	14	94	13	3	2
South Carolina	5	2	7	5,498	854	854	112	5	7	6	16	1
Georgia	9	2	13	1,634	157	157	192	13	26	14	2	0
Florida	5	4	4	116	------	14	32	3	11	10	1	0
EAST SOUTH CENTRAL												
Kentucky	8	11	11	1,927	15	21	18	197	26	18	*7	2
Tennessee	2	4	6	913	63	92	179	16	67	21	6	8
Alabama	4	8	8	3,277	205	281	260	11	50	4	8	3
Mississippi [2]	3	9	9	------	-----	----	------	------	-----	8	0	1
WEST SOUTH CENTRAL												
Arkansas	6	11	11	2,420	158	212	51	57	30	0	4	0
Louisiana	5	5	10	6,430	9	32	24	26	20	17	3	1
Oklahoma	3	8	13	1,760	67	149	14	52	52	4	2	0
Texas	18	35	50	13,126	1,582	1,561	260	63	216	14	5	5
MOUNTAIN												
Montana	1	1	1	654	7	17	145	26	26	2	0	0
Idaho	0	0	1	2	1	3	12	81	46	0	0	0
Wyoming	0	0	0	[3] 334	36	36	21	8	8	0	2	0
Colorado	7	15	14	840	46	68	154	78	78	2	2	1
New Mexico	2	0	1	20	4	4	2	1	29	2	1	0
Arizona	0	2	2	541	83	165	39	7	10	2	2	0
Utah [2]	0	1	0	1,477	12	12	8	374	27	0	2	1
Nevada	0	0	0	138	------	------	2	3	0	1	1	0
PACIFIC												
Washington	12	13	2	45	1	4	102	717	141	16	14	1
Oregon	0	2	1	534	27	39	79	373	65	8	16	0
California	35	29	18	2,531	68	160	258	212	326	42	30	1
Total	250	330	353	[3] 65,649	4,330	4,330	11,703	8,225	8,266	645	309	46
2 weeks	518	702	758	192,355	8,182	8,182	21,862	16,407	16,407	1,225	587	103

See footnotes at end of table.

Telegraphic morbidity reports from State health officers for the week ended January 15, 1944, and comparison with corresponding week of 1943 and 5-year median—Con.

Division and State	Poliomyelitis			Scarlet fever			Smallpox			Typhoid and paratyphoid fever [4]		
	Week ended—		Median 1939–43	Week ended—		Median 1939–43	Week ended—		Median 1939–43	Week ended—		Median 1939–43
	Jan. 15, 1944	Jan. 16, 1943		Jan. 15, 1944	Jan. 16, 1943		Jan. 15, 1944	Jan. 16, 1943		Jan. 15, 1944	Jan. 16, 1943	
NEW ENGLAND												
Maine	0	2	0	21	17	17	0	0	0	0	0	0
New Hampshire	0	0	0	9	9	8	0	0	0	0	0	0
Vermont	0	0	0	3	8	6	0	0	0	0	0	0
Massachusetts	3	2	0	241	306	191	0	0	0	0	0	1
Rhode Island	0	0	0	12	16	4	0	0	0	1	0	0
Connecticut	0	0	0	57	74	72	0	0	0	0	0	1
MIDDLE ATLANTIC												
New York	2	3	3	400	399	399	0	0	0	1	4	8
New Jersey	2	0	0	106	103	173	0	0	0	0	1	1
Pennsylvania	0	1	0	272	285	285	0	10	0	0	2	4
EAST NORTH CENTRAL												
Ohio	1	1	1	246	269	269	0	6	1	4	1	4
Indiana	3	0	0	89	83	135	0	13	5	5	2	1
Illinois	1	0	1	257	223	340	0	1	1	1	0	3
Michigan [3]	0	4	1	111	100	250	0	0	1	0	0	1
Wisconsin	0	0	0	185	336	141	0	0	6	0	0	0
WEST NORTH CENTRAL												
Minnesota	1	0	1	108	92	92	0	0	12	0	1	1
Iowa	0	1	1	77	63	63	1	2	4	0	2	1
Missouri	1	1	0	76	98	92	1	0	1	2	1	1
North Dakota	0	0	0	22	8	15	1	0	0	0	0	0
South Dakota	0	1	0	43	23	22	0	0	1	0	0	0
Nebraska	1	0	0	33	21	38	0	0	0	0	0	0
Kansas	0	3	1	75	63	93	2	0	1	0	0	0
SOUTH ATLANTIC												
Delaware	0	0	0	1	5	13	0	0	0	0	0	0
Maryland [3]	1	0	0	97	66	66	0	1	0	0	8	1
District of Columbia	0	0	0	60	25	13	0	0	0	0	2	0
Virginia	0	1	0	53	52	54	0	0	0	1	1	2
West Virginia	1	0	0	53	28	61	0	0	0	0	1	1
North Carolina	0	1	1	54	50	63	0	0	0	1	2	2
South Carolina	0	0	0	17	19	12	1	1	0	1	0	1
Georgia	0	1	1	13	27	27	1	0	0	0	1	4
Florida	0	0	0	8	5	7	0	0	0	6	0	0
EAST SOUTH CENTRAL												
Kentucky	0	2	2	70	51	70	1	0	0	14	1	1
Tennessee	0	0	0	57	58	58	0	0	0	2	0	1
Alabama	0	1	1	12	15	26	0	2	0	0	2	1
Mississippi [3]	0	0	0	7	13	10	0	0	0	0	0	1
WEST SOUTH CENTRAL												
Arkansas	1	1	1	2	10	10	0	0	1	2	2	2
Louisiana	1	0	0	6	14	14	0	0	0	5	3	7
Oklahoma	2	0	0	18	8	35	1	0	1	1	2	2
Texas	1	9	2	62	59	59	0	0	0	0	0	4
MOUNTAIN												
Montana	0	0	0	54	9	24	0	0	0	0	0	0
Idaho	0	0	0	28	12	12	0	0	0	0	2	0
Wyoming	1	0	0	5	58	8	0	0	0	1	0	0
Colorado	1	0	0	31	53	38	0	0	3	0	0	1
New Mexico	0	1	0	8	1	7	0	0	0	0	0	0
Arizona	0	1	0	18	9	7	0	0	1	5	0	1
Utah [3]	0	0	0	151	90	26	0	0	0	0	0	0
Nevada	0	0	0	0	0	0	0	0	0	0	0	0
PACIFIC												
Washington	2	1	0	225	30	38	1	0	0	1	0	0
Oregon	4	1	0	63	22	22	0	3	3	1	0	1
California	2	7	4	244	192	161	6	0	0	4	0	2
Total	32	46	36	3,860	3,637	3,637	16	39	53	59	41	78
2 weeks	66	80	73	7,324	7,094	7,094	24	81	90	117	94	159

See footnotes at end of table.

Telegraphic morbidity reports from State health officers for the week ended January 15, 1944, and comparison with corresponding week of 1943, and 5-year median—Con.

Division and State	Whooping cough: Week ended— Jan. 15, 1944	Whooping cough: Week ended— Jan. 16, 1943	Whooping cough: Median 1939-43	Week ended Jan. 15, 1944: Anthrax	Dysentery: Amebic	Dysentery: Bacillary	Dysentery: Unspecified	Encephalitis, infectious	Leprosy	Rocky Mt. spotted fever	Tularemia	Typhus fever
NEW ENGLAND												
Maine	8	122	42	0	0	0	0	0	0	0	0	0
New Hampshire	3	1	1	0	0	0	0	0	0	0	0	0
Vermont	6	52	40	0	0	0	0	0	0	0	0	0
Massachusetts	78	256	227	0	0	2	0	1	0	0	0	0
Rhode Island	2	19	19	0	0	0	0	0	0	0	0	0
Connecticut	16	92	108	0	0	0	0	0	0	0	0	0
MIDDLE ATLANTIC												
New York	185	473	540	0	3	21	0	2	0	0	0	0
New Jersey	70	194	194	1	6	0	0	1	0	0	0	0
Pennsylvania	100	373	414	0	0	0	0	1	0	0	0	0
EAST NORTH CENTRAL												
Ohio	89	282	200	0	0	0	0	0	0	0	0	0
Indiana	23	35	35	0	0	0	2	0	0	0	3	0
Illinois	60	177	177	0	0	1	0	1	0	0	1	0
Michigan [2]	42	414	220	0	2	2	[illegible]	0	0	0	0	0
Wisconsin	80	231	231	0	0	0	0	0	0	0	0	0
WEST NORTH CENTRAL												
Minnesota	38	66	66	0	1	0	0	0	0	0	0	0
Iowa	22	30	12	0	0	0	0	0	0	0	0	0
Missouri	13	30	22	0	0	0	0	0	0	0	0	0
North Dakota	13	21	13	0	0	0	1	0	0	0	0	0
South Dakota	0	2	2	0	0	0	0	0	0	0	0	0
Nebraska	3	1	2	0	0	0	0	0	0	0	0	0
Kansas	21	48	48	0	0	0	0	0	0	0	0	0
SOUTH ATLANTIC												
Delaware	0	10	6	0	0	0	0	0	0	0	0	0
Maryland [2]	18	95	84	0	0	0	0	0	0	0	2	0
District of Columbia	6	13	13	0	0	0	0	0	0	0	0	0
Virginia	48	90	53	0	0	0	48	0	0	0	1	0
West Virginia	62	31	31	0	0	0	0	0	0	0	0	0
North Carolina	68	85	197	0	0	0	0	0	0	0	0	3
South Carolina	64	31	66	0	0	3	0	0	0	0	0	1
Georgia	5	31	14	0	0	0	0	0	0	0	2	16
Florida	28	10	11	0	1	1	0	1	0	0	0	8
EAST SOUTH CENTRAL												
Kentucky	37	55	55	0	0	0	3	0	0	0	0	0
Tennessee	9	82	32	0	0	0	2	1	0	0	2	0
Alabama	4	41	28	0	0	0	0	0	0	0	0	10
Mississippi [1]	------	------	------	0	0	0	0	0	0	0	0	1
WEST SOUTH CENTRAL												
Arkansas	17	22	11	0	1	0	0	0	0	0	1	0
Louisiana	2	1	2	0	1	2	0	0	0	0	1	2
Oklahoma	5	8	6	0	0	0	0	0	0	0	0	0
Texas	145	227	96	0	20	295	0	1	0	0	0	15
MOUNTAIN												
Montana	6	27	9	0	0	0	0	0	0	0	0	0
Idaho	1	2	6	0	0	0	0	0	0	0	0	0
Wyoming	5	9	8	0	0	0	0	0	0	0	0	0
Colorado	23	22	28	0	0	0	0	0	0	0	0	0
New Mexico	2	7	14	0	0	1	1	0	0	0	0	0
Arizona	18	19	24	0	1	0	18	0	0	0	0	0
Utah [2]	8	32	32	0	0	0	0	1	0	0	0	0
Nevada	0	0	0	0	0	0	0	0	0	0	0	0
PACIFIC												
Washington	49	38	45	0	0	0	0	0	0	0	0	0
Oregon	16	6	24	0	0	0	0	0	0	0	0	0
California	65	341	183	0	4	9	0	2	0	0	0	2
Total	1,592	4,254	4,254	1	40	337	75	12	0	0	13	58
2 weeks	3,130	7,902	7,902	2	54	633	122	19	0	0	32	117
2 weeks, 1943	------	------	------	1	39	275	75	18	0	1	54	157

[1] New York City only.
[2] Period ended earlier than Saturday.
[3] Exclusive of delayed report (included only in cumulative total) of 96 cases in Wyoming.
[4] Including paratyphoid fever cases reported separately as follows: Missouri, 1; Florida, 3; Louisiana, 2; California, 2.

WEEKLY REPORTS FROM CITIES

City reports for week ended January 1, 1944

This table lists the reports from 85 cities of more than 10,000 population distributed throughout the United States, and represents a cross section of the current urban incidence of the diseases included in the table.

	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
NEW ENGLAND												
Maine:												
Portland	0	0	1	0	32	0	13	0	2	0	0	1
New Hampshire:												
Concord	0	0	------	1	0	0	3	0	0	0	0	0
Vermont:												
Barre	0	0	------	0	0	0	0	0	0	0	0	0
Massachusetts:												
Boston	10	0	------	3	26	6	48	0	51	0	1	8
Fall River	1	0	------	0	0	1	4	0	6	0	0	1
Springfield	0	1	------	0	23	2	4	0	2	0	0	0
Worcester	0	0	------	2	2	1	34	0	35	0	0	0
Rhode Island:												
Providence	0	0	7	3	62	0	19	0	3	0	0	7
Connecticut:												
Bridgeport	0	0	37	9	1	2	8	0	2	0	0	2
Hartford	0	0	2	1	0	0	7	0	1	0	0	0
New Haven	0	0	42	5	1	1	13	0	1	0	0	2
MIDDLE ATLANTIC												
New York:												
Buffalo	0	0	2	8	1	3	27	0	2	0	0	1
New York	5	2	199	33	379	32	225	1	138	0	1	27
Rochester	0	0	0	1	0	4	11	0	0	0	0	0
Syracuse	0	0	------	1	0	4	10	0	[illegible]	0	0	15
New Jersey.												
Camden	1	0	9	9	0	0	8	0	2	0	0	0
Newark	0	0	25	0	7	2	15	0	5	0	1	1
Trenton	0	0	21	6	1	1	21	0	3	0	0	1
Pennsylvania:												
Philadelphia	0	0	57	39	0	14	100	0	21	0	0	10
Reading	0	0	------	5	1	2	6	0	2	0	0	3
EAST NORTH CENTRAL												
Ohio:												
Cincinnati	3	0	14	16	4	14	19	0	22	0	0	3
Cleveland	0	0	86	21	254	9	45	0	28	0	0	17
Columbus	0	0	625	13	19	0	11	0	11	0	0	9
Indiana:												
Fort Wayne	0	0	------	1	5	0	8	0	5	0	0	0
Indianapolis	2	0	------	0	1	6	23	0	26	0	0	4
South Bend	0	0	------	0	0	0	0	0	2	0	0	2
Terre Haute	0	0	------	1	0	0	7	0	0	0	0	0
Illinois:												
Chicago	0	0	40	7	7	20	70	1	68	0	0	31
Springfield	0	0	8	1	11	0	3	0	3	0	0	0
Michigan:												
Detroit	2	0	34	13	14	14	66	0	31	0	0	13
Flint	0	0	------	2	1	1	16	0	2	0	0	0
Grand Rapids	0	0	------	3	82	1	5	0	10	0	0	0
Wisconsin:												
Kenosha	0	0	------	0	0	0	1	0	0	0	0	0
Milwaukee	0	0	4	4	2	2	15	0	24	0	0	23
Racine	0	0	4	4	0	0	2	0	1	0	0	3
Superior	0	0	------	0	43	0	0	0	0	0	0	4
WEST NORTH CENTRAL												
Minnesota:												
Duluth	1	0	------	3	11	0	5	0	10	0	0	9
Minneapolis	3	0	------	7	23	4	15	0	24	0	0	0
St. Paul	1	0	------	5	29	1	9	0	19	0	0	3
Missouri:												
Kansas City	0	0	9	4	2	4	17	0	17	0	0	1
St. Louis	0	0	8	6	10	12	41	0	16	0	0	5
Nebraska:												
Omaha	3	0	------	5	0	0	13	0	6	0	0	0
Kansas:												
Topeka	0	0	1	1	1	0	5	0	2	0	0	3
Wichita	1	0	------	0	19	1	1	0	2	0	0	0

City reports for week ended January 1, 1944

	Diphtheria cases	Encephalitis, infectious, cases	Influenza Cases	Influenza Deaths	Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
SOUTH ATLANTIC												
Delaware												
Wilmington	0	0	--	0	2	0	0	0	1	0	0	0
Maryland												
Baltimore	3	0	85	25	40	4	70	0	25	0	0	10
Cumberland	0	0	16	1	0	0	6	0	0	0	0	0
Frederick	0	0		0	0	0	0	0	0	0	0	0
District of Columbia												
Washington	1	0	603	7	39	6	32	0	31	0	1	3
Virginia												
Lynchburg	0	0	49	0	91	0	0	0	0	0	0	9
Richmond	0	0	14	4	7	1	15	0	2	0	0	0
Roanoke	0	0	---	0	1	0	4	0	0	0	0	6
West Virginia												
Charleston	0	0		0	0		0	0	2	0	0	0
Wheeling	0	0	100	0	0	0	8	0	1	0	0	1
North Carolina												
Winston Salem	0	0	132	3	40	0	2	0	1	0	0	0
South Carolina												
Charleston	0	0	472	1	4	0	7	0	4	0	0	0
Georgia												
Atlanta	1	0	704	7	6	2	9	0	8	0	0	0
Brunswick	0	0		0	28	2	2	0	0	0	0	0
Savannah	0	0	1 298	6	0	0	2	0	2	0	0	0
Florida												
Tampa	0	0	200	0	0	1	1	0	0	0	0	0
EAST SOUTH CENTRAL												
Tennessee												
Memphis	0	0	37	6	0	3	15	0	4	0	0	1
Nashville	0	0		6	0	1	10	0	2	0	0	0
Alabama												
Birmingham	0	0	202	6	15	0	12	0	0	0	0	0
Mobile	0	0	88	3	0	0	5	0	0	0	0	0
WEST SOUTH CENTRAL												
Arkansas												
Little Rock	0	0	299	1	3	0	2	1	0	0	0	0
Louisiana												
New Orleans	0	0	52	13	4	4	18	0	7	0	1	0
Shreveport	0	0		2	0	0	10	0	1	0	0	0
Texas												
Dallas	1	0	17	8	0	0	15	0	0	0	1	1
Galveston	0	0		1	0	0	3	0	0	0	0	0
Houston	2	0		2	3	1	19	1	0	0	0	0
San Antonio	1	0	18	10	0	0	24	0	0	0	0	1
MOUNTAIN												
Montana												
Billings	2	1	1	1	0	0	1	0	0	0	0	0
Great Falls	0	0	519	1	30	0	1	0	4	0	0	0
Helena	0	0		0	1	0	0	0	2	0	0	0
Missoula	0	0	300	0	0	0	2	0	1	0	0	0
Idaho												
Boise	0	0	139	0	0	1	1	0	2	0	0	0
Colorado												
Denver	2	0	25	6	10	2	15	1	10	0	0	12
Pueblo	0	0		1	92	0	3	0	0	0	0	1
Utah												
Salt Lake City	0	0	1	1	3	0	2	0	26	0	0	0
PACIFIC												
Washington												
Seattle	1	0		5	3	2	15	0	3	0	0	9
Spokane	0	0	2	1	12	0	5	0	17	0	0	1
Tacoma	1	0		5	4	0	0	0	25	0	0	1
California												
Los Angeles	3	0	568	12	40	6	15	0	22	0	0	7
Sacramento	1	0	37	2	4	0	3	0	7	0	0	0
San Francisco	4	0	569	7	0	0	25	0	10	0	0	2
Total	56	4	7 782	399	1 556	200	1,352	5	833	0	6	274
Corresponding week, 1942	65	2	180	57	1,687	81	593	8	829	0	13	800
Average, 1938-42	97		1,563	[1] 59	[2] 1,560		485		986	9	14	1,042

Dysentery, amebic—Cases Boston, 1, New York, 1, St Louis, 1
Dysentery, bacillary—Cases Worcester, 16, New York, 5, Chicago, 1, Detroit, 2, Charleston, S C, 6
Dysentery, unspecified—Cases Baltimore, 1, Richmond, 1, San Antonio, 3
Tularemia—Cases New York, 1, Indianapolis, 1
Typhus fever—Cases New York, 1, Savannah, 2, New Orleans, 2, San Antonio, 2

[1] 3-year average, 1940-42

[2] 5-year median

Rates (annual basis) per 100,000 population, by geographic groups, for the 85 cities in the preceding table (estimated population, 1942, 33,929,400)

	Diphtheria case rates	Encephalitis, infectious, case rates	Influenza		Measles case rates	Meningitis, meningococcus, case rates	Pneumonia death rates	Poliomyelitis case rates	Scarlet fever case rates	Smallpox case rates	Typhoid and paratyphoid fever case rates	Whooping cough case rates
			Case rates	Death rates								
New England	27 3	2 5	221	59 6	365	32 3	380 1	0 0	256	0 0	2 5	52
Middle Atlantic	2 8	0 9	148	48 2	184	29 3	199 8	0 5	85	0 0	0 9	27
East North Central	4 1	0 0	476	50 2	259	39 1	169 9	0 6	136	0 0	0 0	64
West North Central	18 3	0 0	37	67 0	193	44 6	215 1	0 0	195	0 0	0 0	43
South Atlantic	8 7	0 0	6,374	93 7	448	27 8	274 2	0 0	134	0 0	1 7	50
East South Central	0 0	0 0	1,942	124 7	89	23 8	249 5	0 0	36	0 0	0 0	6
West South Central	11 7	0 0	1,132	108 5	29	14 7	266 9	5 9	23	0 0	5 9	6
Mountain	32.2	8 0	7 919	80 4	1,093	24 1	201 0	8 0	362	0 0	0 0	105
Pacific	17 5	0 0	2,055	55 9	110	14 0	110 1	0 0	147	0 0	0 0	35
Total	8 6	0 6	1,196	61 3	239	30 7	207 8	0 8	128	0 0	0 9	42

TERRITORIES AND POSSESSIONS

Hawaii Territory

Plague (human).—On December 29, 1943, 1 death from human plague was reported in Kukuihaele, Hamakua District, Island of Hawaii, T. H., bringing the total number of deaths from plague to 7 for the year 1943 to date. The previous deaths occurred on March 5, March 28, April 11, May 3, August 22, and December 19, 1943. The death on December 29 was a 42-year-old male who had lived approximately 9 miles from where the preceding death occurred.

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—Week ended December 18, 1943.—During the week ended December 18, 1943, cases of certain communicable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox		27		207	320	122	92	98	124	990
Diphtheria		12	5	43	1	4	2	2		69
Dysentery (bacillary)				19						19
Encephalitis, infectious				1						1
German measles				11	6		1	2	4	24
Influenza		36			855	23	80			994
Measles	1	1		155	222	7	8	62	2	458
Meningitis, meningococcus				1	4				2	7
Mumps		8		66	89	39	6	10	13	231
Poliomyelitis			1	1						2
Scarlet fever		3	1	58	150	49	18	31	27	337
Tuberculosis (all forms)			1	121	45	15			20	202
Typhoid and paratyphoid fever		1		6					1	8
Undulant fever					1					1
Whooping cough		4		62	57	19	9	7	9	167

JAMAICA

Notifiable diseases—4 weeks ended December 18, 1943.—During the 4 weeks ended December 18, 1943, cases of certain notifiable diseases were reported in Kingston, Jamaica, and in the island outside of Kingston, as follows:

Disease	Kingston	Other localities	Disease	Kingston	Other localities
Chickenpox	2	7	Leprosy		1
Diphtheria	3	1	Tuberculosis	11	74
Dysentery	4	3	Typhoid fever	6	55
Erysipelas	1	1	Typhus fever	1	1

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

NOTE.—Except in cases of unusual prevalence, only those places are included which had not previously reported any of the above-mentioned diseases, except yellow fever, during the current year. All reports of yellow fever are published currently.

A cumulative table showing the reported prevalence of these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.

(Few reports are available from the invaded countries of Europe and other nations in war zones.)

Plague

Belgian Congo—Blukwa Region—Lonito.—During the week ended December 4, 1943, 2 cases of plague with 2 deaths were reported in Lonito, in the Blukwa Region, Belgian Congo.

British East Africa—Kenya.—During the week ended December 11, 1943, 1 case of plague with 1 death was reported in Kenya, British East Africa.

Madagascar.—During the month of November 1943, 2 cases of plague with 2 deaths were reported in Madagascar.

Yellow Fever

Portuguese Guinea.—During the week ended December 18, 1943, yellow fever was reported present in inland towns and other Portuguese West African possessions, and for the week ended December 25, 1943, 3 cases of yellow fever were reported in Portuguese Guinea.

Sierra Leone—Gallinas.—On December 1, 1943, 1 case of suspected yellow fever with 1 death was reported in Gallinas, Sierra Leone.

×

Public Health Reports

VOLUME 59 JANUARY 28, 1944 NUMBER 4

IN THIS ISSUE

Illness from Cancer in the United States—Concluded

CONTENTS

Public Health Reports

Vol. 59 • **JANUARY 28, 1944** • *No. 4*

ILLNESS FROM CANCER IN THE UNITED STATES[1]

By HAROLD F. DORN, *Senior Economist, United States Public Health Service*

VI. Regional Differences in Illness from Cancer

INCIDENCE RATES FOR ALL FORMS OF CANCER

Cancer attacks more people in the South than in any other region of the country, relative to the size of the population involved (fig. 15). The number of new cases per 100,000 population per year is nearly 50 percent higher in the South than in the North among white males and nearly 40 percent higher among white females. The incidence rates in the West are intermediate between those for the North and South.

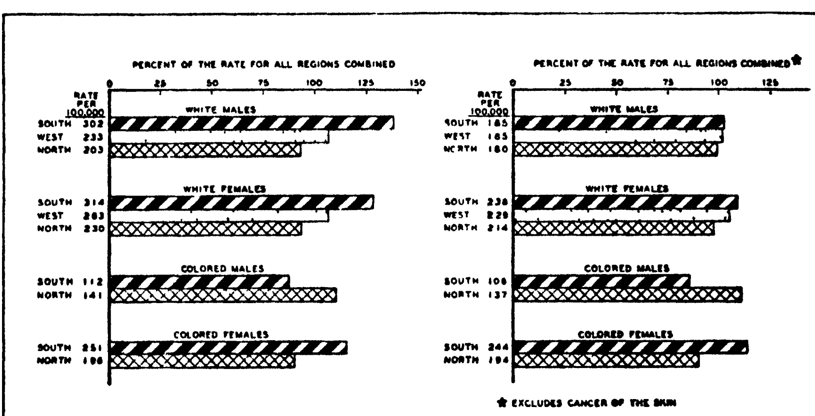


FIGURE 15.—The incidence rate of cancer including and excluding cancer of the skin expressed as a percentage of the rate for all regions combined, by color, sex, and region. (All rates standardized for age using the total urban population of the United States, 1940.)

For the colored population the incidence rates are also higher in the South than in the North among females but the opposite is true for males. It is quite possible that this latter fact reflects the failure of southern male Negroes to obtain medical care rather than a greater resistance to cancer.

[1] This is the third and final section of a paper on illness from cancer in the United States. The first two sections appeared in the PUBLIC HEALTH REPORTS, 59: 33-48 (Jan. 14, 1944), 65-77 (Jan. 21, 1944). The numbering of tables, figures, and references is consecutive throughout the three sections.

The higher illness rates from cancer in the South are in striking contrast to the relative rank of mortality rates which are known to be lowest in the South and highest in the Northeast and in the Pacific Coast States.[3] Some have suggested that the mortality rates from cancer are low in the South because a large number of persons with cancer fail to obtain medical care and that the cause of death is certified to be senility or some cause other than cancer. These data do not support this suggestion, at least for persons who live in metropolitan areas.

The higher illness rate from cancer in the South is due primarily to the relatively larger number of cases of skin cancer in that region (fig. 15). If cases with cancer of the skin are excluded, the incidence rates in the three regions are essentially equal for white males and differ only slightly for white females; for the latter the rates in the South are about 10 percent higher than those in the North. Since cancer of the skin is relatively rare among Negroes, exclusion of such cases does not noticeably affect the relative size of the illness rates in the North and South.

INCIDENCE RATES BY AGE, SEX, AND COLOR

Incidence rates for the white population present much the same picture for separate age groups as for all ages combined (figs. 16 and 17). The greatest difference between the North and West occurs among persons over 65 years of age. The higher rates among southern residents are clearly visible throughout most of the life span.

The illness rates for the colored population are somewhat puzzling (fig. 18). In the South the rates increase until about 60 years of age, after which a decrease occurs; in the North the highest rates occur at about 70 years of age. The decrease in the reported rates among the aged may mean merely that many elderly Negroes with cancer do not receive any medical treatment. It is also apparent from figure 18 that there is no significant difference in the incidence rates of illness from cancer between northern and southern male Negroes except after 60 years of age. For females, however, the rates in the South are clearly higher than those in the North between 25 and 70 years of age.

REGIONAL VARIATIONS IN THE INCIDENCE OF CANCER OF DIFFERENT PRIMARY SITES

For the white population, cancer of the buccal cavity and skin is considerably higher in the South than in either the West or North (fig. 19). The high illness rate from cancer of the buccal cavity in the South largely results from a higher incidence of cancer of the lip

[3] Cancer Mortality in the United States. II. Recorded cancer mortality in geographic sections of the Death Registration States of 1920, from 1920 to 1935. By Mary Gover. Pub. Health Bull. No. 252. Government Printing Office, 1940.

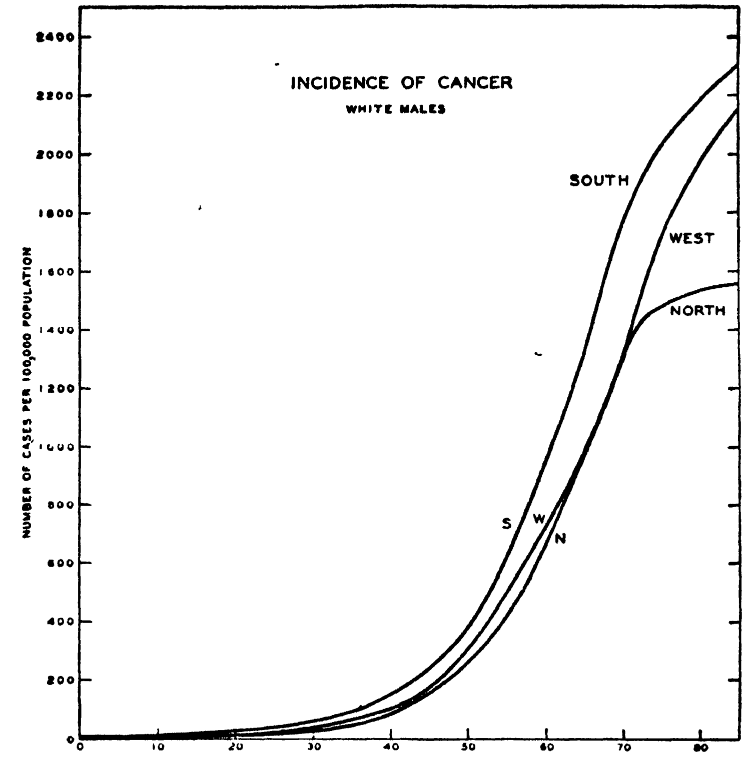


FIGURE 16.—Incidence rates of cancer by age for white males in the North, South, and West.

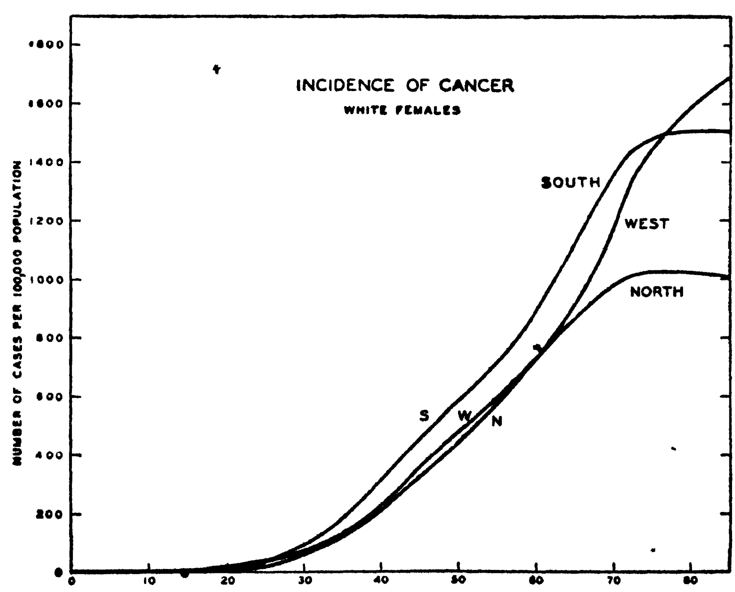


FIGURE 17.—Incidence rates of cancer by age for white females in the North, South, and West.

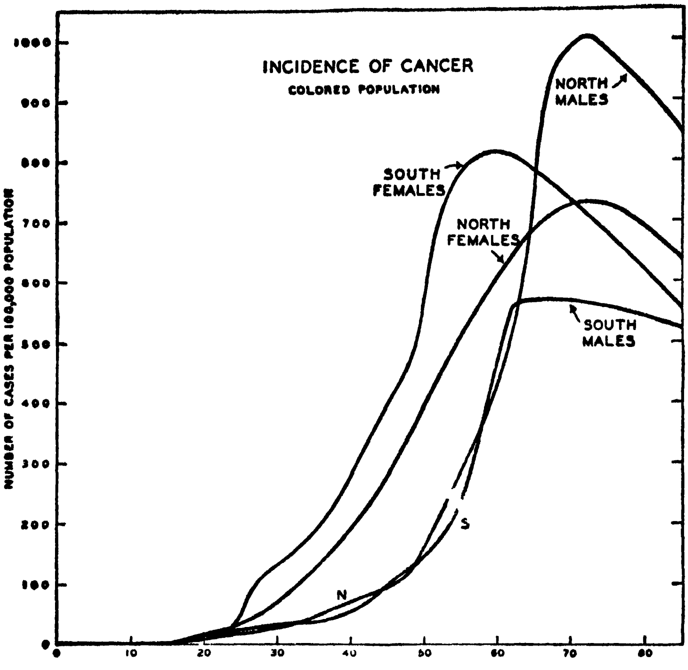


Figure 18.—Incidence rates of cancer by age and sex for the colored population in the North and South.

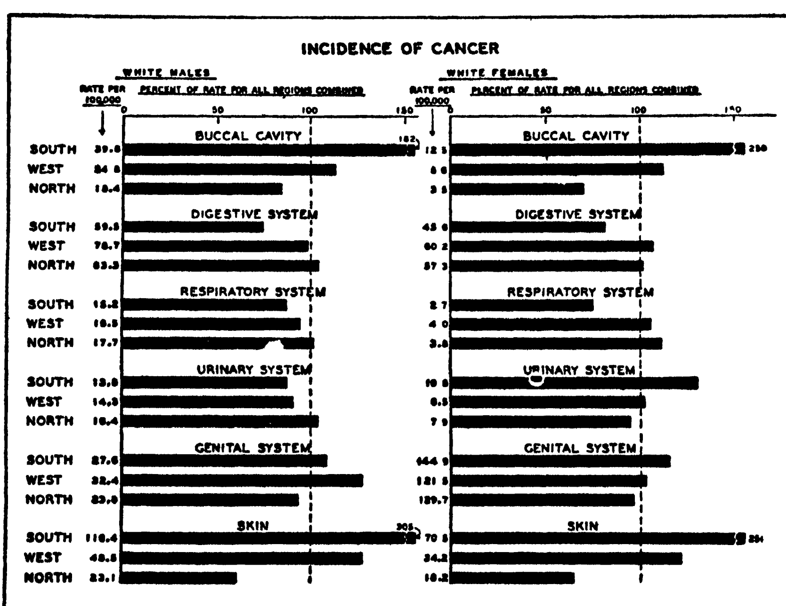


Figure 19.—Incidence rates of cancer of certain groups of primary sites expressed as a percentage of the rate for all regions combined for white males and females by region. (All rates standardized for age using the total urban population of the United States, 1940.)

which like cancer of the skin is usually an epithelial tumor. The high incidence of malignant tumors located on the surface of the body among residents of the South suggests that this condition may be associated with exposure to the sun. A large body of clinical observations as well as a number of experimental investigations support this belief (*16*, *17*, *23*).

The incidence of cancer of other sites among white males is lower in the South than in the North and West except for malignant neoplasms of the genital system. Among white females, however, cancer of the genital and urinary systems shows the same regional variation as cancer of the skin and buccal cavity. It is only for cancer of the digestive and respiratory systems that the incidence of cancer is lower among southern white females than among those living in other regions.

VARIATION IN THE PREVALENCE OF CANCER OF SPECIFIC PRIMARY SITES

Since the number of cases of cancer of specific primary sites was too small for reliable age specific illness rates by regions, especially for the colored population, the regional variation is shown by means of an index of morbidity constructed in the same way as the Standardized Mortality Ratio used by the Registrar-General of England and Wales in the reports on occupational mortality. The standard chosen was the male rate for the specific site in question for all regions combined except for cancer of the female genital system in which case the female rate for all regions combined was used.

Although the absolute size of the rates is considerably less in the colored than in the white population, cancer of the skin is relatively more frequent in the South than in the North for Negroes as well as for whites (fig. 20). For each of the other broad groups of sites, illness rates are higher among northern than among southern male Negroes. Except for cancer of the buccal cavity and the genital system the same comment applies to the illness rates among female Negroes.

As was indicated above, the high rate of cancer of the buccal cavity among white persons living in the South is due principally to the high rate of illness from cancer of the lip (fig. 21). Malignant tumors of the tongue and mouth are also somewhat more common among southern whites than among whites living in the North or West but the difference is not as large as for cancer of the lip.

Cancer of the digestive tract with the exception of the mouth, liver, and pancreas is relatively more prevalent in the North and less prevalent in the South. The regional variation is greater for males than for females but even for the latter the lower prevalence of can-

cer of the digestive tract among those living in the South is clearly evident.

As can be seen from figure 19, when all forms of genital cancer among white females are treated as a group the incidence rates are highest in the South. From figure 21, it is evident that the high rate in the South is due to a high rate of illness from cancer of the uterus

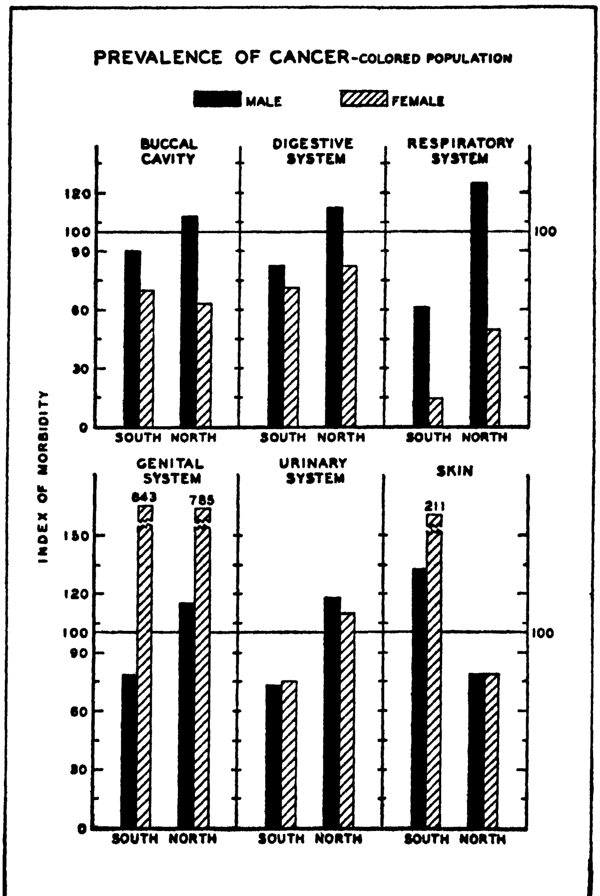


Figure 20.—Relative index of the prevalence of cancer of certain groups of primary sites for colored males and females by regions

primarily and to a lesser degree to a high rate from cancer of the vulva and vagina. There is little regional variation in the prevalence of cancer of the breast.

It has been asserted that there is an antagonism in the development of cancer in two different organs (*18*, *19*), that is to say, the development of cancer of one site in the body may inhibit the development of a malignant tumor elsewhere in the body.

Moreover, this theory has been broadened to include all persons in a homogeneous population group. In its expanded form the theory states that an increase in the incidence of cancer of one particular organ in one individual of a group due to a direct effect will be followed by a decrease in the incidence of cancer of other organs or tissues among other members of the group with the result that, while the relative rank of cancer of the separate primary sites may change, the

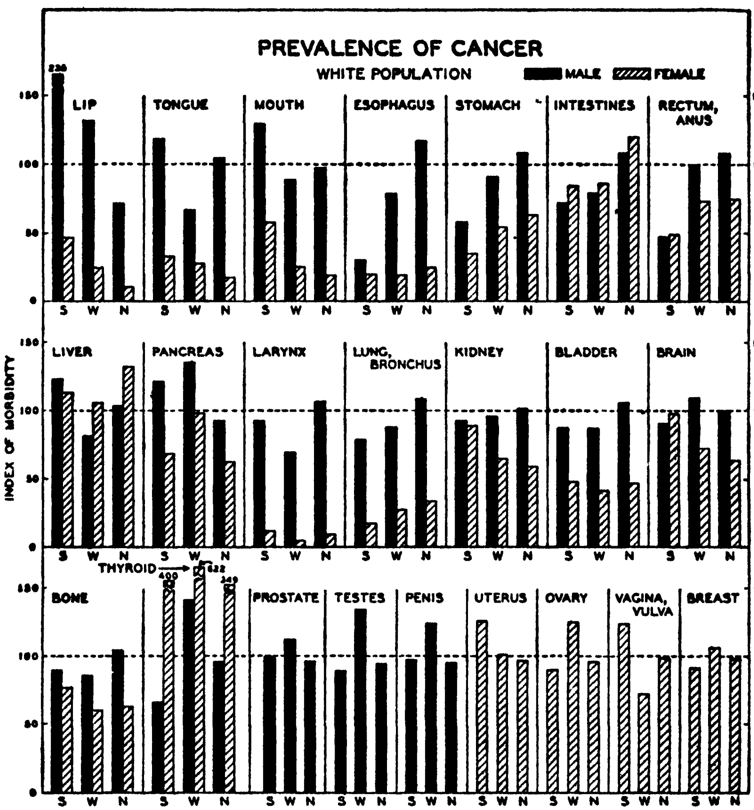


FIGURE 21.—Relative index of the prevalence of cancer of specific primary sites for white males and females by region.

total incidence of cancer of cell sites will remain unaltered (*20*). Indeed one writer has proposed that skin tumors be induced artificially since these can be fairly readily cured in expectation that the incidence of more fatal forms of cancer will be thereby reduced (*21*).

This theory has been tested on mice by a number of workers. Although some of the early experiments were interpreted as confirming the theory, later experiments conducted with a larger number of mice have failed to confirm it (*22*).

The data in this study also fail to confirm the theory insofar as human populations are concerned. The incidence of cancer among white persons in the South is more than 40 percent higher than among white persons living in the North (fig. 15). The higher incidence among residents of the South is due to the greater frequency of skin cancer for when this form of cancer is excluded the rates in the three regions—North, South, and West—do not differ greatly. In other words, an increase in the incidence of skin cancer, instead of decreasing the incidence of malignant tumors of other sites, has increased the total incidence of cancer.

Furthermore, not only are malignant neoplasms of the skin relatively more frequent among residents of the South but cancers of the genital system among white males and cancers of the genital and urinary systems among white females are also higher among residents of the South (fig. 19). Until more reliable evidence in its support can be found, the theory of the antagonism in the development of cancer of two different organs must be regarded as invalid.

VII. Mortality From Cancer

DEATH RATES BY SEX AND COLOR

Death rates standardized for age for the cities included in this survey are shown in figure 22 for white and colored males and females. Corresponding rates of illness were presented in figure 1.[3] In the white population there is no sex difference in the mortality rate from cancer but in the colored population the death rate for females is nearly 50 percent greater than the rate for males. The sex difference in illness rates also is greater in the colored than in the white popula-

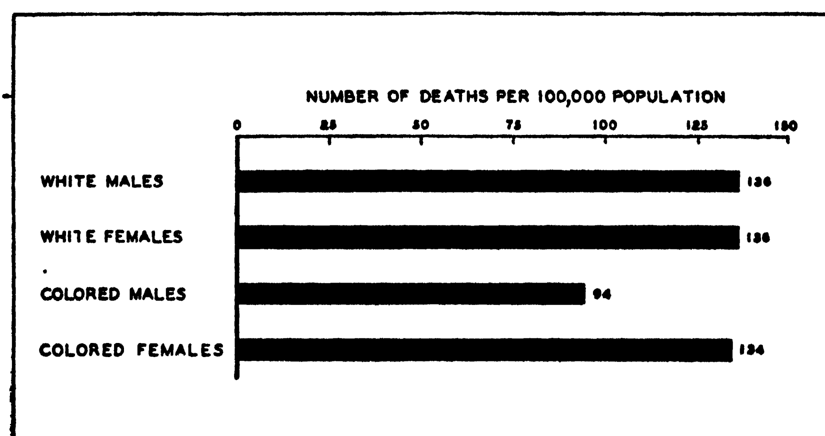


FIGURE 22.—Number of deaths from cancer per 100,000 population by sex and color. (All rates standardized for age using the total urban population of the United States, 1940.)

[3] Published in PUBLIC HEALTH REPORTS, vol. 59, p. 40, Jan. 14, 1944.

tion; in contrast to the death rates the incidence rate of illness is about 12 percent higher among white females than among white males.

The sex difference in mortality from cancer in the colored population probably is not as great as it appears in figure 22. If, as has been suggested before, an appreciable number of male Negroes fail to receive medical care after they develop cancer, it is probable that the tumor also escapes attention at time of death so that the cause of death is attributed to another cause.

There is less difference in the death rates than in the illness rates of the white and nonwhite populations The death rate from cancer for white males is 46 percent greater than the rate for colored males, but the incidence rate of illness is 72 percent greater for white males than for colored males. For females, the corresponding percentage excesses are 1 and 13, respectively. The greater racial difference in illness than in death rates may be attributed to the fact that skin cancer, which is relatively nonfatal, occurs more frequently in the white than in the colored population. If cancer of the skin is excluded, the incidence rates of illness are essentially equal for white and colored females and, although the rate for white males is still larger than the rate for colored males, the excess is relatively less than for the death rate.

DEATH RATES FROM CANCER OF CERTAIN PRIMARY SITES

From figure 23 it can be seen that the death rate from cancer for white females equals that for white males only because mortality from

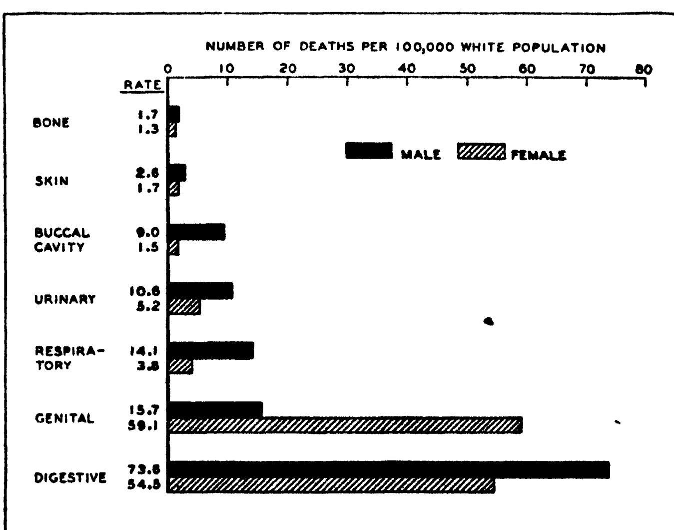


FIGURE 23.—Number of deaths from cancer per 100,000 white population by sex and certain groups of primary sites. (All rates standardized for age using the total urban population of the United States, 1940.)

cancer of the genital system is about four times as great for females as for males. Death rates from cancer of the buccal cavity, digestive tract, respiratory system, urinary system, skin and bones are all higher among males than among females.

The same general comments apply to death rates from cancer in the colored population as can be seen from figure 24.

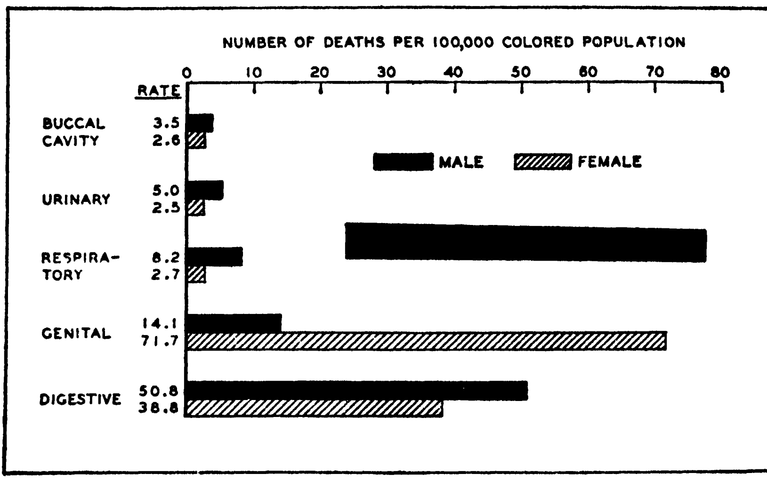


FIGURE 24.—Number of deaths from cancer per 100,000 colored population by sex and certain groups of primary sites. (All rates standardized for age using the total urban population of the United States, 1940.)

REGIONAL VARIATION IN THE DEATH RATE FROM CANCER

The death rate from cancer for the white population is highest in the North and lowest in the South with the rate in the West intermediate between the two (table 5). This regional variation in mortality rates is the direct reverse of the regional variation in illness rates. Incidence rates of illness are highest in the South and lowest in the North. If cases with skin cancer are excluded, the regional rank of illness rates is unchanged for white females; for white males there is essentially no regional difference when cases with skin cancer are excluded.

TABLE 5.—*Incidence rates of illness and death rates from cancer for the white population by sex and region* [1]

Region	Males			Females		
	Death rate	Illness rate		Death rate	Illness rate	
		All cases	Excluding skin cancer		All cases	Excluding skin cancer
North	144	203	180	141	230	213
West	122	233	185	130	263	229
South	106	302	185	117	314	238

[1] Rates standardized for age using the total urban population of the United States, 1940

The same comments apply to the death and illness rates of colored females (table 6). Illness and death rates both are higher among northern than among southern male negroes, but, as has been pointed out previously, this may be due to differences in the proportion of men who obtain medical care.

TABLE 6.—*Incidence rates of illness and death rates from cancer for the colored population by sex and region* [1]

Region	Males			Females		
	Death rate	Illness rate		Death rate	Illness rate	
		All cases	Excluding skin cancer		All cases	Excluding skin cancer
North	111	141	137	140	196	194
South	66	112	106	121	251	244

[1] Rates standardized for age using the total urban population of the United States, 1940.

Since the lower death rate in the South cannot be explained by a lower illness rate, it must be due either to better medical care or to a more favorable prognosis of the disease which may result from a large proportion of cases with forms of cancer which are most readily cured or from the initiation of treatment at an early stage in the development of the tumor. There is no reason to believe that physicians in the North are less competent than those in the South, so that a more favorable prognosis would seem to be the primary explanation of the lower death rate in the South.

Figure 25 presents the death rate from cancer of certain important primary sites by regions for white males and females. Except for cancer of the urinary system, the death rates in the South are lower than the rates in either the North or West.

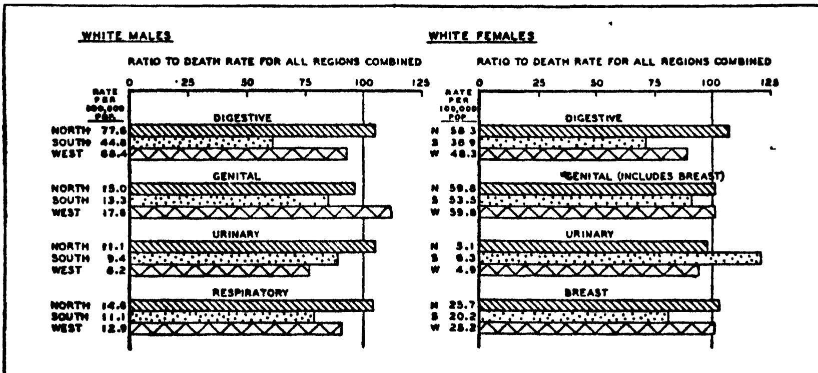


FIGURE 25.—Number of deaths from cancer per 100,000 white population for groups of primary sites by sex and region expressed as a ratio to the corresponding rate for all regions combined. (All rates standardized for age using the total urban population of the United States, 1940.)

As can be seen from figures 19 and 21, the illness rates in the South are relatively high for cancer of the skin and buccal cavity which is due largely to cancer of the lip, and relatively low for cancer of the digestive and respiratory systems. The first two forms of cancer can be cured more easily than the latter two, a fact which would tend to make the death rate in the South lower than the rate in the North.

VIII. The Relative Fatality of Different Forms of Cancer

It should be apparent by now that mortality records are an unsatisfactory substitute for morbidity reports of cancer. Not only do the two kinds of rates differ in size, but mortality rates also give a misleading impression of the prevalence of cancer due to the differences in the fatality of the various forms of malignant tumors.

The relative frequency of the organs and tissues which are the primary sites of cancer among living and dead cases is shown in tables 7 and 8 for the white population. The greatest difference for white males is in the relative prevalence of cancer of the skin and buccal cavity (about one-half of the buccal cavity cases are cancer of the lip). These two sites account for 23 percent of all living male cases of cancer in the North, 32 percent in the West, and 54 percent in

TABLE 7.—*Percentage distribution by primary site of cancer cases and cancer deaths for white males by geographic region*

Primary site	North		West		South	
	Cases	Deaths	Cases	Deaths	Cases	Deaths
Buccal cavity	10.5	6.6	11.0	5.0	14.2	8.7
Lip	4.0	0.5	6.3	0.5	8.9	1.4
Tongue	2.2	1.9	1.4	1.6	1.7	3.1
Mouth	1.1	0.8	0.8	0.4	0.8	0.8
Jaw	0.9	1.1	0.6	0.5	0.5	1.1
Pharynx	0.7	1.3	0.5	1.0	0.6	1.1
Digestive organs	37.7	55.2	32.6	54.3	17.5	43.1
Esophagus	2.8	4.7	2.0	3.2	0.6	0.6
Stomach, duodenum	14.3	22.9	12.0	22.8	6.0	15.4
Intestines	8.0	10.1	6.6	9.4	4.2	9.5
Rectum, anus	8.3	7.7	7.3	8.2	2.7	4.1
Liver, biliary passage	2.0	5.3	1.8	5.0	2.1	7.3
Pancreas	1.8	3.9	2.4	4.7	1.6	4.8
Respiratory system	9.4	11.2	7.0	10.4	5.3	11.4
Larynx	3.1	2.4	1.9	2.0	1.9	2.0
Lung	4.9	6.9	3.1	5.1	2.6	6.7
Other	1.4	1.9	2.0	3.3	0.8	2.7
Genital organs	11.1	9.8	13.7	13.7	8.3	11.9
Prostate	9.1	8.7	11.5	12.3	7.0	10.5
Other	2.0	1.1	2.2	1.4	1.3	1.4
Urinary organs	8.5	7.9	6.9	6.6	5.0	9.1
Kidney	2.1	2.1	1.6	2.3	1.3	3.3
Bladder	6.5	5.8	5.3	4.3	3.7	5.8
Skin	12.5	1.4	20.6	1.7	40.0	5.2
Brain	1.4	0.6	1.2	0.9	1.0	0.6
Bone	2.1	1.3	1.5	1.0	1.3	1.6
All other	6.7	6.0	5.5	6.4	7.4	8.4
All sites	100.0	100.0	100.0	100.0	100.0	100.0
Number	10,519	5,245	2,530	989	2,568	641

the South. However, they are found in only 8 percent of the deaths in the North, 7 percent in the West, and 14 percent in the South.

More than one-half of the deaths from cancer of white males in the North and West and 43 percent in the South are attributed to cancer of the digestive organs. Cancer of the respiratory system also constitutes a somewhat higher proportion of dead than of living cases while cancer of the genital and urinary organs make up about the same proportion among both living and dead cases.

TABLE 8.—*Percentage distribution by primary site of cancer cases and cancer deaths for white females by geographic region*

Primary site	North		West		South	
	Cases	Deaths	Cases	Deaths	Cases	Deaths
Buccal cavity	1.4	0.8	2.2	1.4	3.6	2.3
Lip	0.4	0.1	1.0	0.1	1.5	0.0
Tongue	0.3	0.2	0.5	0.6	0.5	0.5
Mouth	0.2	0.1	0.2	0.1	0.3	0.2
Jaw	0.3	0.2	0.2	0.4	0.5	0.5
Pharynx	0.1	0.2	0.1	0.1	0.2	0.6
Digestive organs	20.8	41.0	20.5	37.3	12.9	32.8
Esophagus	0.5	1.0	0.4	0.8	0.3	0.6
Stomach, duodenum	5.9	13.6	5.9	12.7	2.8	10.3
Intestines	6.4	11.6	5.9	9.4	4.5	9.8
Rectum, anus	4.4	4.6	4.3	4.3	2.4	4.0
Liver, biliary passage	2.4	7.1	1.9	5.0	1.7	5.1
Pancreas	0.9	2.5	1.5	3.8	0.8	2.2
Respiratory system	1.6	3.0	1.5	2.4	1.0	2.0
Larynx	0.2	0.2	0.1	0.2	0.2	0.1
Lung	1.1	2.4	1.0	1.7	0.5	1.6
Other	0.3	0.4	0.4	0.5	0.3	0.3
Genital organs	29.5	24.8	25.4	25.7	29.8	29.2
Uterus	24.1	18.9	19.4	18.5	25.3	23.7
Other	5.4	5.9	6.0	7.2	4.5	5.5
Urinary organs	3.0	3.5	2.9	3.8	3.0	5.3
Kidney	0.8	0.9	0.8	1.7	1.1	2.1
Bladder	2.2	2.6	2.1	2.1	1.9	3.2
Breast	28.6	18.5	27.9	18.9	21.3	17.5
Skin	7.8	1.0	12.3	1.0	21.9	2.8
Brain	0.6	0.6	0.5	0.4	0.8	0.9
Bone	1.1	1.0	1.1	0.9	0.9	1.0
All other	5.6	5.8	5.7	8.2	4.8	6.2
All sites	100.0	100.0	100.0	100.0	100.0	100.0
Number	13,854	5,503	3,354	1,107	3,244	818

About 9 out of every 10 living white women with cancer have cancer of the digestive organs, genital organs including breast, or skin. More than one-half of the sites first attacked by cancer are in the genital system (including breast). Cancer of the skin is especially frequent among white women in the South where it is found in 1 out of every 5 cases; in each of the three regions, however, skin is the primary site only about one-half as frequently among females as among males.

The digestive organs are the most frequent site of fatal cancer for males but the genital organs (including breast) are the most frequent site for females. About 50 percent of deaths from cancer among males are the result of cancer of the digestive tract; almost the same

percentage of deaths from cancer among females are caused by cancer of the genital organs (including breast).

In discussing communicable diseases, fatality is usually expressed by means of a case fatality rate which is 100 or 1,000 times the ratio of the number of deaths to the number of cases. A rate of this nature has a definite meaning and is useful when discussing the outcome of an acute disease of short duration. However, its meaning is not so clear in the case of a chronic disease which may last several years.

As an approximate index of the relative fatality of cancer of different organs or tissues, the percentage of cases dying within one year of the date of first diagnosis will be used as shown in tables 9 and 10. Since the prognosis of a case of cancer depends upon the stage of the disease at the time of diagnosis as well as upon the anatomical site, this index should be considered as only approximately indicating the relative fatality of cancer of different primary sites.

The percentage of persons dying within one year of first diagnosis from cancer alone and from all causes combined, malignant and nonmalignant, is shown in tables 9 and 10. Except for cancer of the brain the percentage dying from all causes is only slightly higher than the percentage dying from cancer alone. The rather large difference in

TABLE 9.—*Percentage of persons with diagnosed cancer who died within one year after diagnosis, classified by broad groups of primary sites*

Primary site	Percentage dying from—		Number of cases	Primary site	Percentage dying from—		Number of cases
	All causes	Cancer			All causes	Cancer	
Digestive system	61	59	5,024	Genital system (female)	29	28	8,051
Respiratory system	58	54	821	Buccal cavity, pharynx	22	21	1,084
Brain	47	20	194	Breast	21	21	2,406
Urinary system	42	40	909	Skin	4	4	2,911
Genital system (male)	41	38	876	All other	36	33	1,261
Bone	39	36	193	All sites	36	34	18,730

TABLE 10.—*Percentage of persons with diagnosed cancer who died within one year after diagnosis, classified by the primary site of the cancer*

Primary site	Percentage dying from—		Number of cases	Primary site	Percentage dying from—		Number of cases
	All causes	Cancer			All causes	Cancer	
Liver, biliary passages	78	75	462	Pharynx	40	40	65
Esophagus	75	73	211	Larynx	39	38	202
Pancreas	73	70	350	Bladder	39	37	641
Stomach	64	62	1,711	Bone, except jaw	39	36	193
Lung, bronchus	65	61	544	Mouth	32	32	90
Intestines	56	54	1,282	Testes	29	28	89
Kidney	52	50	242	Uterus	27	26	2,462
Tongue	48	47	177	Nasal cavity, sinuses	24	22	85
Rectum, anus	45	43	877	Breast	21	21	2,406
Bone, jaw	43	42	74	Brain	47	20	194
Fallopian tubes	43	41	462	Vagina, vulva	18	18	124
Prostate	43	40	724	Lip	6	5	528

the case of brain tumors arises from the difficulty of making an accurate diagnosis of the malignancy of the tumor prior to death and from the fact that the cause of death is frequently entered on the death certificate as "brain tumor" which, in the absence of specific information to the contrary, is coded as a benign tumor.

More than one-half of the persons with cancer of the digestive and respiratory systems die within one year of diagnosis (table 9). This should not be interpreted as meaning that more than one-half of the persons die within one year of the onset of the disease for at the time of diagnosis the tumor may be and probably is well developed. The least fatal is cancer of the skin; only 4 percent of the persons with this form of cancer died within 12 months of first diagnosis.

When individual primary sites are considered, more than two-thirds of the cases of cancer of the liver and biliary passages, esophagus and pancreas, and from one-half to two-thirds of those with cancer of the stomach, lungs and bronchus, intestines and kidneys died within one year of diagnosis (table 10). The locations with the most favorable outcome are skin, lip, vagina, vulva, and breast.

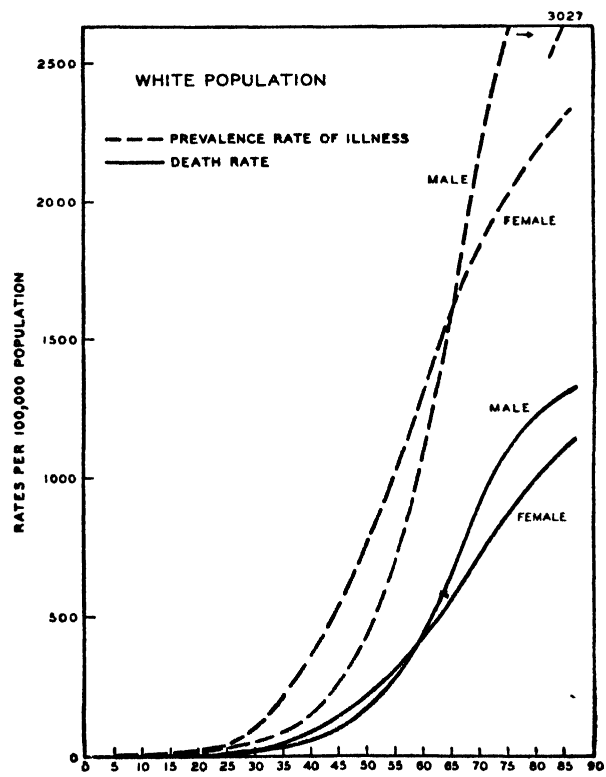


FIGURE 26.—Prevalence rates of illness and death rates per 100,000 white population from cancer by sex and age.

Figure 26 shows the relative magnitude of illness and death rates from cancer by age for the white population. Females experience higher morbidity and mortality rates during early and middle adult life, from about 25 to 60 to 65 years of age, due to the development of cancer of the genital system, but in late adult life the rates are definitely higher among males.

When the morbidity and mortality rates are plotted on semilogarithmic paper, the distance between the two curves remains fairly constant

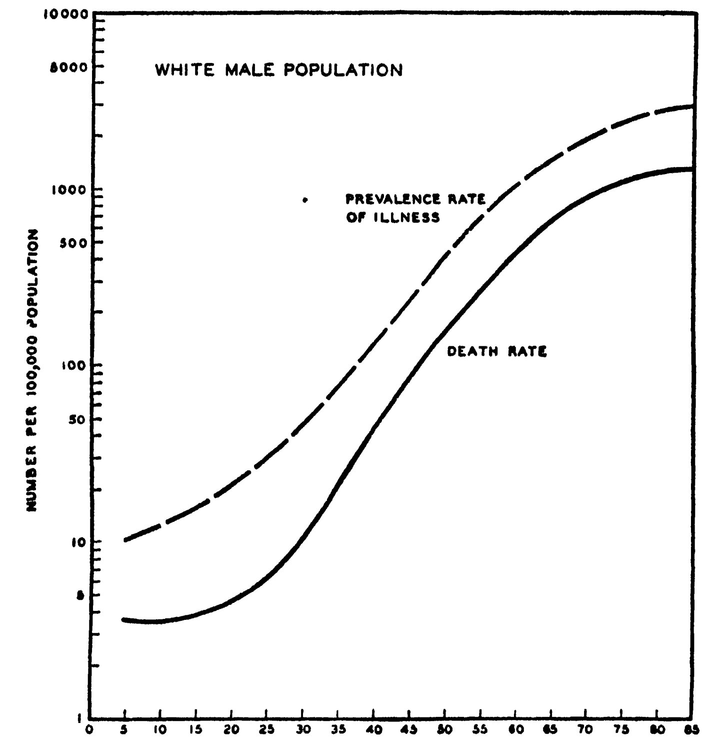


FIGURE 27 —Prevalence rates of illness and death rates per 100,000 white male population from cancer by age (logarithmic vertical scale).

after about age 40 (figs. 27 and 28). This means that the ratio of the two rates remains constant which suggests that the fatality of cancer does not vary greatly with the age of the person affected during the latter half of the life span. This interpretation should not be overstressed since the data, at best, are only suggestive.

IX. The Estimated Number of Cases of Cancer in the United States

In 1940 there were 158,335 deaths attributed to cancer registered in the United States. The number of living cases is unknown. However, an estimate of the number of persons receiving treatment

for a malignant tumor can be obtained by multiplying the population of the United States reported by the census of population in 1940 by the illness rates found in this study.

Although these data were collected from physicians and hospitals in metropolitan areas, it is believed that they may be used without serious error to estimate the number of cases of cancer in the entire country. Mortality reports indicate that the death rate from cancer is higher among urban than among rural residents Part of this

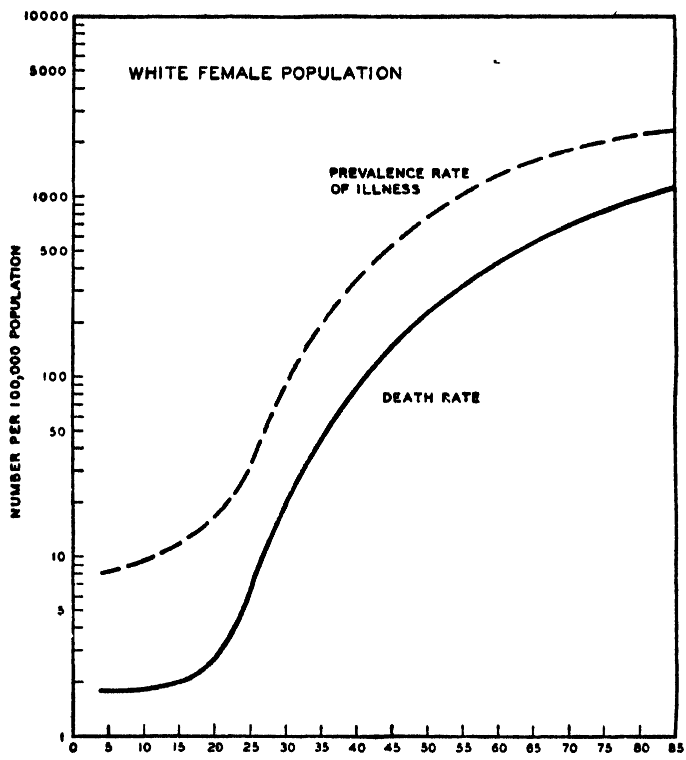


FIGURE 28 —Prevalence rates of illness and death rates per 100,000 white female population from cancer by age (logarithmic vertical scale)

difference may be due to more accurate diagnosis of the cause of death in urban areas so that the real difference in the death rates is probably less than the observed difference.

Furthermore, the illness rates reported here are almost certainly less than the true but unknown rates. Some persons who die from cancer have never received any treatment for the disease. When all factors are taken into consideration, the illness rates reported here undoubtedly understate rather than overstate the number of persons with cancer in the population.

On the basis of the prevalence rates found in this study, it is estimated that there are about 475,000 to 500,000 persons under treatment for cancer at any given time in the United States. About 300,000 new cases of cancer are diagnosed for the first time during each year. In addition to these cases are those who have been treated and cured as well as those with an undiagnosed tumor. The number in the latter two categories is unknown.

REFERENCES

(*16*) Blum, Harold F.: Sunlight and cancer of the skin. J. Nat. Cancer Inst., **1**: 397–421 (1940).
(*17*) Blum, Harold F., Kirby-Smith, John S., and Grady, Hugh G.: Quantitative induction of tumors in mice with ultraviolet radiation. J. Nat. Cancer Inst., **2**: 259–268 (1941).
(*18*) Cramer, W.: The prevention of cancer. Lancet, **1**: 1–5 (January 6, 1934).
(*19*) Editorial. Lancet, **2**: 577–578 (September 5, 1936).
(*20*) Cramer, W.: On an antagonism in the development of malignancy in two different organs. J. Path. and Bact., **43**: 77 89 (1936).
(*21*) Peller, Sigismund: Carcinogenesis as a means of reducing cancer mortality. Lancet, **2**: 552–556 (September 5, 1936).
(*22*) Bonser, F. M., and Connal, K. I.: Effect of the presence of a malignant tumor upon the development of a second malignant tumor. J. Path. and Bact., **48**: 263–274 (1939).
(*23*) Blum, Harold F.: Some fundamental aspects of tumor development. Illustrated by studies with ultraviolet radiation. J. Nat. Cancer Inst., **3**: 564–581 (1943).

Appendix—Concluded

TABLE 8.—*Number of deaths per 100,000 white population by age, sex, and groups of primary sites for all regions combined: number of deaths per 100,000 colored population by age and sex for all regions combined*

Site group and sex	Under 25	25–29	30–34	35–39	40–44	45–49	50–54	55–59	60–64	65–69	70–74	75 and over	All ages: Crude	All ages: Standardized [1]	Number of deaths
							White population								
Buccal cavity:															
Male	([2])—	0.2	0.4	2.1	2.4	5.3	13.5	22.0	48.9	45.0	65.8	99.2	7.8	9.0	450
Female	0.1	0.2	0.2	0.9	0.5	1.3	2.1	1.6	4.0	5.9	11.5	26.1	1.4	1.5	82
Digestive organs:															
Male	0.9	4.1	6.8	15.0	32.5	64.2	105.9	192.5	307.2	430.9	589.1	668.6	64.5	73.6	3,708
Female	0.3	3.3	8.1	13.3	26.5	51.0	86.8	134.5	203.8	274.1	396.6	602.7	50.8	54.5	2,940
Respiratory:															
Male	0.3	0.2	2.1	5.7	13.4	20.5	34.7	52.2	66.0	63.8	52.4	53.5	13.3	14.1	765
Female	0.2	0.6	0.6	1.1	2.7	5.4	10.3	12.0	14.9	16.3	23.9	15.5	3.6	3.8	208
Uterus: Female	—	2.4	8.7	19.3	30.4	45.7	63.2	73.4	93.0	96.3	109.9	127.5	24.9	26.0	1,440
Breast: Female	0.1	2.0	5.2	12.8	30.2	41.6	48.9	78.2	86.5	119.8	106.1	143.9	23.7	25.0	1,370
Genital organs:															
Male	0.2	1.0	1.8	2.3	1.8	4.6	8.3	19.0	42.8	118.2	156.2	263.8	12.7	15.7	728
Female	0.3	5.9	16.3	36.8	71.4	101.7	128.5	178.7	208.8	249.3	250.4	300.4	56.3	59.2	3,258
Urinary organs:															
Male	0.4	0.4	0.6	2.1	2.9	8.9	17.4	33.2	43.8	43.5	97.1	99.2	9.3	10.6	537
Female	0.2	0.4	1.0	0.6	0.9	3.8	6.4	10.4	16.9	36.5	44.0	60.9	4.8	5.2	279
Skin:															
Male	0.1	0.1		0.6		1.8		5.6		16.3		45.7	2.1	2.6	121
Female	0.1	0.1		0.6		0.3		3.3		8.1		41.5	1.5	1.7	89
Bones:															
Male	0.7	0.2		1.0		2.1		3.6		7.0		17.0	1.5	1.7	89
Female	0.2	0.1		0.4		2.9		4.0		6.6		6.8	1.3	1.3	73
All sites:															
Male	4.4	7.7	15.0	31.8	61.0	119.6	198.2	351.7	548.0	765.3	1,030.9	1,312.4	119.6	136.5	6,876
Female	2.1	11.8	29.9	59.1	112	177.7	253.2	362.3	495.6	632.8	795.1	1,107.9	128.5	136.3	7,428
							Colored population								
All sites:															
Male	3.0	8.3	17.1	32.0	76.2	119.0	170.7	277.4	374.7	461.4	709.2	475.9	64.5	93.8	408
Female	3.7	36.7	54.5	89.6	212.9	214.1	345.5	414.6	524.0	387.7	525.6	330.8	99.9	134.4	693

[1] Standardized for age using the total urban population of the United States, 1940.
[2] A dash indicates a rate of less than 0.1.

PROVISIONAL MORTALITY RATES FOR THE FIRST HALF OF 1943

The mortality rates in this report are based upon preliminary data from 39 States, the District of Columbia, Alaska, Hawaii, and the Canal Zone. Comparative data for the first 6 months of 1942 and 1941 are presented for 36 States and the District of Columbia.

This report is made possible through a cooperative arrangement with the States which furnish provisional quarterly tabulations of current births and deaths to the United States Public Health Service. Because of some lack of uniformity in the method of classifying deaths according to cause, as well as some delay in filing certificates, these data are preliminary and some deviation from the final figures may be expected, especially for specific causes of death for individual States. Nevertheless, it is believed that the trend of mortality within each State is reasonably accurate.

Population estimates for the different States used in computing rates were as follows: 1943—United States Census Bureau estimates of the total population in each State as of March 1, 1943, based on registration for War Ration Book Two and corrected for soldiers and sailors stationed within the State; 1942—United States Census Bureau estimates of the total population as of July 1, 1942, based on registration for War Ration Book One with the same corrections noted above; 1941—average of the total enumerated population according to the Federal census of April 1, 1940, and the estimated total population as of July 1, 1942.

The estimates as described above are of the de facto population, including military personnel stationed within the State. Since deaths of soldiers on posts within the continental United States are registered with the local and State authorities, the populations used should include military personnel stationed in this country.

There is a bias in present death rates which operates toward overstating the mortality. Although males outside the country are neither in the population nor deaths, they represent age groups which normally have low death rates and their exclusion makes for a higher *crude* death rate because larger proportions of the remaining population are in the older age brackets where death rates are higher. Such a bias would affect rates from different causes in a different way, and it is not feasible with the data at hand to evaluate the extent of these errors.

The mortality rate from all causes for the first half of 1943 was about 6 percent higher than the corresponding period in 1942 but the same as the rate for the first half of 1941. Twenty-six of the States for which information is available reported an increase in the death rate for the first half of 1943 over the first half of 1942, 9 reported a

decrease and in 2 States the rate was the same. The death rate from all causes among persons insured in the industrial department of the Metropolitan Life Insurance Company for the first 6 months of the year was about 6 percent above the rate for the corresponding period in 1942.

The birth rate for the first half of 1943 was 20.9 per 1,000 population as compared with 18.9 and 17.6 for the same periods of 1942 and 1941, respectively. Thirty-four of the 36 reporting States showed an increase in the birth rate for the first half of 1943 over the same period in 1942.

Infant and maternal mortality continued to decrease. Infant mortality was 42 per 1,000 live births in the first half of 1943 as compared with 44 and 49 in the same period of 1942 and 1941, respectively. Both the first and second quarters of 1943 showed decreases from the same quarters of 1942. In 21 States the infant mortality rate for the first half of 1943 was less than in that half of 1942, in 10 States it was more in 1943, and in 5 States the rates for the 2 years were the same. Maternal mortality was 2.4 per 1,000 live births in the first half of 1943 as compared with 2.6 and 3.2 in the corresponding periods of 1942 and 1941, respectively. Both the first and second quarters of 1943 showed decreases from 1942. The maternal mortality rate for the first half of 1943 decreased from that of the same period in 1942 in 24 States, increased in 9 States, and was the same in 3 States.

Several of the acute communicable diseases showed higher rates in 1943 than in 1942. Diphtheria, which nearly always shows a decrease, was slightly higher this year than in the first half of 1942, 18 of the 37 States showing an increase and 7 others having the same rate, with 12 States decreasing. Cerebrospinal fever was outstandingly high throughout the first half of 1943.

Influenza and pneumonia both showed higher rates in the first half of 1943 than in the first half of 1942, but lower than in the first half of 1941. While the rates were slightly higher for 1943 than 1942, there was no evidence of any specific influenza epidemic. Comparing the first half of 1943 with the same half of 1942, 23 of the 37 States had higher influenza rates in 1943 and 14 had lower rates than in 1942. Twenty-six of the 37 States had higher pneumonia rates in 1943 than in 1942; 10 States had lower rates in 1943; and 1 had the same rate for the 2 years.

The tuberculosis death rate was lower in the first half of 1943 than in the same period of either of the 2 preceding years. By quarters, however, the rate for the first 3 months of 1943 was comparatively low, but for the second quarter the rate was slightly higher than in 1942 but lower than in 1941. In 16 States the tuberculosis rate was higher in the first half of 1943 than in the corresponding period of 1942, the other 21 being lower in 1943. Among the States with higher

tuberculosis rates in 1943 were such large ones as New York, Pennsylvania, New Jersey, Illinois, and Michigan. Some States in nearly every section showed increases.

The degenerative diseases showed the usual increases. In 26 of the 37 States the death rates from cancer and from intracranial lesions of vascular origin were higher than in 1942, and the death rate from heart diseases was higher in 32 of the 37 States in 1943 than in 1942. Twenty-four of the States contributed to the 6 percent increase in the diabetes death rate and 20 of the States had a higher nephritis death rate in 1943 than in 1942.

The death rate from all accidents in the first half of 1943 was 66 per 100,000 as compared with 66 and 69 for the corresponding periods of 1942 and 1941, respectively. The total accidental death rate was higher in 1943 than in 1942 in 21 of the 37 States. The death rate from automobile accidents was 14 in the first half of 1943 as compared with 21 and 24 in the same half of 1942 and 1941, respectively. The rate was lower in 1943 than in 1942 in 36 of the 37 States. The death rate from accidents other than automobile increased to 52 in 1943 as compared with 45 in the first half of both 1942 and 1941.

Provisional mortality from certain causes in the first 6 months of 1943, with comparative provisional data for the corresponding period in preceding years

State and period	All causes, rate per 1,000 population (annual basis)	Births (exclusive of stillbirths) per 1,000 population (annual basis)	Rate per 1,000 live births: Total infant mortality	Rate per 1,000 live births: Maternal mortality	Death rate per 100,000 population (annual basis): Typhoid and paratyphoid fever (1-2)	Dysentery (27)	Diarrhea and enteritis under 2 years (119)	Scarlet fever (8)	Diphtheria (10)	Whooping cough (9)	Measles (35)	Cerebrospinal (meningococcus) meningitis (6)	Acute poliomyelitis and polioencephalitis (36)	Acute infectious encephalitis (lethargic) (37)	Tuberculosis, all forms (13-22)	Syphilis (30)	Influenza (grippe) (33)	Pneumonia, all forms (107-109)	Cancer, all forms (45-55)	Diabetes mellitus (61)	Intracranial lesions of vascular origin (83)	Diseases of the heart (90-95)	Nephritis, all forms (130-132)	All accidents, including automobile accidents (169-195)	Automobile accidents (170 a, b, c)
37 STATES[1]																									
January-June:																									
1943	11.0	20.9	42	2.4	0.3	0.8	5.2	0.4	0.7	2.7	1.5	2.4	0.2	0.5	43.0	11.4	12.1	57	122	28.1	98	328	76	66	13.6
1942	10.4	18.9	44	2.6	.4	1.0	4.5	.4	.6	1.9	1.4	.7	.2	.4	43.9	11.6	11.1	53	120	26.5	91	302	74	66	20.7
1941	11.0	17.6	49	3.2	.5	(2)	4.5	.4	.6	3.0	2.6	.5	.3	.5	46.7	(2)	26.7	59	118	27.8	91	307	78	69	24.2
January-March:																									
1943	11.3	21.1	44	2.3	.3	.5	4.1	.5	1.0	2.6	1.2	2.4	.2	.5	41.3	11.9	15.7	69	121	29.2	102	343	78	65	13.8
1942	11.0	18.9	• 50	2.7	.4	.8	3.4	.5	1.0	2.0	1.6	.6	.2	.4	43.5	11.9	15.6	67	120	28.4	97	322	78	67	23.0
1941	11.7	17.6	53	3.2	.5	(2)	3.4	.5	.8	2.9	1.6	.6	.3	.5	46.6	(2)	45.0	79	118	30.3	96	332	83	67	23.5
April-June:																									
1943	10.7	20.7	40	2.5	.4	1.1	6.3	.3	.5	2.8	1.7	2.4	.3	.5	44.6	11.0	8.5	46	122	27.1	94	314	75	68	13.3
1942	9.9	18.9	41	2.6	.5	1.1	5.6	.3	.3	1.9	1.3	.7	.2	.4	44.3	11.3	6.6	39	119	24.8	86	282	69	66	18.6
1941	10.2	17.8	45	3.3	.6	(2)	5.6	.4	.4	3.1	3.7	.4	.3	.5	46.7	(2)	8.7	40	119	25.4	86	284	73	70	24.8
Industrial policyholders:[3]																									
1943	8.2	----	----	----	.2	----	[4] 3.3	.4	.7	1.4	.8	----	----	----	41.5	10.4	7.7	45	108	30.1	70	[5] 249	[6] 54	49	11.6
1942	7.7	----	----	----	.3	----	[4] 3.3	.5	.5	1.0	.7	----	----	----	43.5	11.2	5.8	35	105	30.2	63	[5] 228	[6] 53	51	18.4
1941	8.0	----	----	----	.5	----	[4] 2.6	.6	.6	1.4	1.3	----	----	----	44.7	11.9	12.7	41	105	30.3	64	[5] 227	[6] 56	47	19.3
Alaska:																									
1943	21.3	21.1	136	2.5	(7)	(7)	2.6	2.6	(7)	67.7	23.4	2.6	(7)	(7)	383.0	13.0	62.5	229	107	5.2	65	229	29	347	13.0
1942	17.5	25.9	121	1.0	(7)	(7)	7.9	(7)	2.6	15.9	5.3	5.3	(7)	(7)	341.8	5.3	18.5	135	80	7.9	66	217	40	254	10.6
1941	20.8	28.4	121	5.7	5.4	(2)	(7)	(7)	(7)	10.8	86.3	2.7	5.4	(7)	498.8	(2)	102.4	154	84	8.1	92	186	38	170	(7)
California:																									
1943	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	---

See footnotes at end of table.

Provisional mortality from certain causes in the first 6 months of 1943, with comparative provisional data for the corresponding period in preceding years—Continued

State and period	All causes, rate per 1,000 population (annual basis)	Births (exclusive of stillbirths) per 1,000 population (annual basis)	Rate per 1,000 live births: Total infant mortality	Rate per 1,000 live births: Maternal mortality	Death rate per 100,000 population (annual basis): Typhoid and paratyphoid fever (1-2)	Dysentery (27)	Diarrhea and enteritis under 2 years (119)	Scarlet fever (8)	Diphtheria (10)	Whooping cough (9)	Measles (35)	Cerebrospinal (meningococcus) meningitis (6)	Acute poliomyelitis and polioencephalitis (36)	Acute infectious encephalitis (lethargic) (37)	Tuberculosis, all forms (13-22)	Syphilis (30)	Influenza (grippe) (33)	Pneumonia, all forms (107-109)	Cancer, all forms (45-55)	Diabetes mellitus (61)	Intracranial lesions of vascular origin (83)	Diseases of the heart (90-95)	Nephritis, all forms (130-132)	All accidents, including automobile accidents (169-195)	Automobile accidents (170 a, b, c)
37 States—Continued																									
Canal Zone:																									
1943	11.1	20.9	47	5.6	(7)	(7)	(7)	(7)	(7)	(7)	(7)	(7)	(7)	(7)	46.7	27.2	(7)	16	47	19.5	43	109	47	405	54.5
Colorado:																									
1943	11.2	21.1	45	3.0	0.2	0.3	2.4	0.7	1.9	1.2	5.5	4.2	(7)	0.5	55.1	10.4	15.4	87	123	15.8	88	282	74	79	11.4
1942	11.6	19.9	52	2.2	.5	.5	1.5	1.1	1.3	4.2	2.7	.5	0.4	.2	57.4	10.9	12.0	95	124	18.9	100	273	80	90	27.4
1941	11.1	18.7	52	3.1	.9	(2)	4.9	1.1	1.6	5.8	2.2	.7	.7	.7	53.8	(2)	31.1	72	112	14.6	84	292	83	70	24.0
Connecticut:																									
1943	9.9	17.7	30	1.4	(7)	.2	2.4	.1	(7)	.5	.6	1.8	(7)	.6	30.6	6.3	3.7	42	135	29.6	90	353	55	54	10.2
1942	9.0	14.8	30	2.1	(7)	(7)	2.5	(7)	(7)	.2	.3	.5	(7)	.1	31.2	6.5	2.3	28	125	30.7	82	299	62	52	13.9
1941	9.5	12.1	36	3.2	.2	(2)	1.7	.2	(7)	.3	.1	.2	.1	(7)	34.1	(2)	8.0	37	130	34.5	83	329	68	58	17.1
Delaware:																									
1943	12.2	22.0	38	2.0	.7	(7)	3.7	(7)	(7)	6.5	.7	12.3	(7)	1.5	38.4	15.9	12.3	86	115	34.1	115	394	140	62	14.5
1942	11.9	18.0	36	.8	(7)	(7)	3.7	2.9	(7)	(7)	(7)	(7)	(7)	.7	57.1	12.3	8.0	61	129	29.6	109	392	129	71	21.7
1941	12.5	18.1	46	(7)	(7)	(2)	5.2	1.5	(7)	3.7	3.0	(7)	(7)	(7)	55.4	(2)	20.7	68	121	27.4	106	388	143	63	23.7
District of Columbia:																									
1943	11.0	25.8	38	1.9	.5	.2	7.0	1.6	(7)	3.4	.5	3.9	(7)	(7)	59.4	13.6	5.2	66	134	28.9	63	310	96	53	8.6
1942	10.5	22.9	42	2.5	.2	(7)	12.4	.2	.2	2.8	(7)	2.6	.2	(7)	61.3	19.8	3.5	65	130	27.3	71	272	91	62	16.1
1941	11.9	22.8	48	2.6	.3	(2)	7.3	(7)	.5	2.4	.5	1.1	.3	(7)	60.2	(2)	6.6	82	146	25.9	89	308	100	68	20.1
Florida:																									
1943	9.8	16.5	52	3.8	.6	1.5	8.1	.2	1.0	3.1	.5	2.4	.2	.4	33.9	17.2	20.2	47	83	18.5	111	221	71	108	18.6
1942	11.0	16.2	59	4.0	1.9	2.4	8.5	.1	1.7	2.4	4.2	.9	.1	.1	44.0	16.8	19.0	53	92	19.5	108	267	72	90	28.4
1941	12.7	17.4	59	7.0	1.3	(2)	8.1	.1	.9	1.8	1.5	.8	1.8	.5	47.3	(2)	44.9	58	104	22.4	123	313	92	119	40.1
Georgia:																									
1943	8.4	21.8	50	3.7	.4	1.5	6.4	.1	.9	6.4	.9	1.7	(7)	.2	36.5	11.9	19.8	57	59	12.5	86	164	90	58	14.0
1942	8.5	19.3	57	4.2	.4	1.8	5.5	.1	1.0	2.9	3.3	.6	.3	.1	37.4	12.8	20.2	59	59	11.7	84	158	96	57	19.3
1941	10.1	19.7	65	4.0	.5	(2)	8.9	.3	1.0	4.5	7.5	.5	.5	.1	43.9	(2)	55.1	67	61	13.2	98	190	103	65	26.9

Hawaii:																									
1943	7.7	25.5	45	1.3	(7)	.5	9.1	(7)	.5	4.6	(7)	.9	(7)	(7)	55.2	13.7	5.5	42	75	18.7	45	136	47	114	19.6
1942	7.6	23.2	43	2.2	2.3	(7)	6.0	(7)	(7)	5.1	.5	.5	(7)	(7)	56.8	13.4	3.7	51	67	15.7	43	140	62	81	18.0
1941	7.2	22.2	47	1.9	1.4	(2)	12.7	(7)	.9	1.9	2.3	(7)	.5	.5	53.0	(2)	2.8	45	81	16.9	54	127	54	70	19.2
Idaho:																									
1943	10.1	22.1	37	2.3	1.3	.9	.4	.4	.8	.8	5.1	2.5	.8	2.5	17.8	3.0	14.8	68	97	14.4	74	300	54	90	18.2
1942	9.8	23.5	37	2.0	.4	(7)	(7)	(7)	.8	.8	.8	.4	(7)	.4	16.4	3.0	13.9	62	84	16.9	96	278	62	84	19.1
1941	9.0	24.0	39	2.0	1.2	(2)	1.6	.8	(7)	5.6	.4	.8	(7)	1.2	15.3	(2)	18.9	40	90	22.1	82	228	62	83	26.3
Illinois:																									
1943	11.9	18.8	36	2.0	.1	.3	3.1	.4	1.3	1.3	1.1	1.7	.1	.6	43.9	11.4	6.5	46	153	34.0	95	419	93	61	14.1
1942	11.1	16.7	36	2.3	.3	.6	1.7	.4	.8	1.2	.8	.2	.1	.2	42.5	10.8	6.0	45	146	33.1	89	370	87	67	22.2
1941	11.1	15.1	37	2.8	.2	(2)	2.2	.7	.7	1.0	1.8	.2	.0	.3	46.2	(2)	10.1	50	148	30.9	82	362	94	69	27.0
Indiana:																									
1943	11.9	20.6	41	2.5	.2	.1	6.0	.6	.7	3.3	3.8	1.9	.2	.4	35.7	10.4	22.3	70	124	16.4	149	279	92	68	14.6
1942	10.9	17.6	39	3.2	.2	.2	3.0	.5	.3	1.6	.4	.1	.2	.4	38.5	10.1	20.1	58	121	12.7	136	254	81	74	29.4
1941	11.6	16.3	43	2.9	.5	(2)	2.0	.9	1.0	1.8	2.7	.7	1	.1	39.6	(2)	32.4	61	121	15.6	144	295	68	86	36.4
Iowa:																									
1943	11.3	19.4	38	1.7	.1	.3	2.2	1.1	.3	1.9	1.4	1.1	.1	.2	17.3	7.0	11.0	48	149	31.4	127	355	69	69	10.1
1942	10.4	19.2	35	2.1	(7)	.2	2.1	.2	.2	1.7	1.0	.1	.1	.4	15.7	6.6	11.2	45	145	26.4	116	303	65	67	17.6
1941	10.3	17.4	39	2.7	.2	(2)	1.4	.6	.3	1.7	1.0	.3	.1	.3	14.3	(2)	21.7	54	133	27.2	108	305	64	59	18.9
Kansas:																									
1943	11.2	19.4	37	2.1	(7)	.3	2.2	1.6	9	1.9	.7	1.9	.3	1.5	23.4	10.2	17.3	45	127	30.6	126	325	94	82	14.4
1942	11.0	17.7	40	2.5	(7)	.3	3.4	.5	(7)	1.3	2.5	.4	.1	1.1	24.9	10.4	21.8	42	129	28.9	120	320	93	77	21.1
1941	11.2	16.5	43	2.3	.1	(2)	2.1	.3	.3	4.4	3.4	.8	.1	1.0	26.2	(2)	36.0	47	122	28.6	110	309	104	73	26.3
Kentucky:																									
1943	10.0	22.5	50	2.1	.9	1.9	6.2	.4	.7	4.3	6.6	3.5	.4	.5	63.6	9.5	24.3	75	82	15.3	98	255	76	54	11.1
1942	10.2	19.9	57	3.5	1.0	2.2	5.4	1.0	1.4	4.3	1.5	1.0	.6	.2	68.3	9.8	23.1	73	86	15.8	94	246	83	71	18.4
1941	11.1	20.5	60	4.9	1.4	(2)	6.4	1.1	1.0	8.5	8.6	1.1	.9	.1	77.6	(2)	67.1	76	83	17.5	105	236	82	72	25.5
Louisiana:																									
1943	9.4	21.0	49	3.1	.8	1.0	5.6	(7)	.6	4.4	1.0	1.3	.5	.2	53.8	18.5	15.2	57	82	16.6	73	239	69	55	13.5
1942	9.3	18.6	58	3.4	1.4	1.6	7.9	.1	1.5	2.5	1.9	.8	.5	.2	50.6	22.7	16.5	54	84	16.9	66	230	69	53	16.6
1941	10.1	19.8	65	4.6	2.3	(2)	9.6	.2	1.1	2.1	.2	.7	.3	.1	57.6	(2)	44.0	66	83	16.0	67	257	87	63	21.0
Maine:																									
1943	14.5	23.8	55	2.3	(7)	(7)	7.5	3	.5	4.0	.5	9.3	5	.8	36.0	9.3	23.3	84	167	28.0	153	439	111	78	11.3
1942	13.1	20.0	44	2.0	.2	(7)	5.2	.7	.2	1.2	2.2	2.4	(7)	1.0	32.4	7.8	14.1	66	150	33.9	134	380	87	83	20.0
1941	13.6	18.0	56	2.8	.2	(2)	5.1	.2	.5	2.6	1.5	1.2	.2	.5	34.4	(2)	34.2	75	157	32.7	135	408	101	73	19.3
Maryland:																									
1943	11.9	21.2	43	1.9	4	.1	5.3	.3	.6	2.8	.5	6.0	(7)	.6	66.2	15.7	5.5	70	126	31.1	94	361	120	73	15.3
1942	11.3	18.2	45	2.4	.2	.2	5.5	.2	2	1.0	1.2	2.7	(7)	.4	72.1	18.9	6.3	63	125	29.3	90	337	114	72	22.6
1941	12.2	17.0	58	2.2	.4	(2)	4.4	.1	(7)	4.5	1.1	1.2	.1	.3	76.8	(2)	16.3	75	142	32.6	94	357	123	75	27.0
Massachusetts:																									
1943	13.6	(2)	(2)	(2)	.2	.1	5.2	.8	.2	1.0	.9	3.5	.1	.2	44.5	7.4	4.5	88	170	41.4	123	501	71	72	9.5
1942	11.6	(2)	(2)	(2)	.1	.1	2.4	.3	.1	.7	.6	.8	(7)	.2	38.5	6.4	2.9	63	169	37.9	113	414	64	60	12.6
1941	12.7	(2)	(2)	(2)	.0	(2)	4.4	.4	.1	.9	.2	.9	(7)	.3	40.5	(2)	12.1	81	173	38.9	112	479	72	61	16.4
Michigan:																									
1943	11.0	23.3	41	1.9	.2	.2	5.0	.2	.3	2.2	2.3	2.7	.1	.3	37.2	10.6	9.0	63	126	29.2	100	350	57	60	15.3
1942	9.6	20.4	41	2.2	.1	.4	3.0	.7	.3	.9	.3	.3	.0	.4	33.9	10.6	4.5	49	114	26.2	89	296	49	62	24.0
1941	10.2	18.1	42	3.2	.1	(2)	3.0	.9	.2	1.9	2.4	.1	.0	.1	35.3	(2)	13.8	52	116	27.7	89	306	57	74	33.4
Minnesota:																									
1943	10.9	23.5	32	1.6	(7)	(7)	1.3	.6	.7	1.2	.6	.7	(7)	.6	31.4	7.8	7.2	56	155	30.9	116	324	47	60	9.1
1942	9.8	20.2	33	1.5	.1	.2	2.7	.3	.3	.6	.8	.2	.3	.5	26.3	8.6	8.1	54	143	26.5	98	288	45	64	18.9
1941	10.0	19.4	36	2.4	(7)	(2)	2.7	.2	.4	1.3	.1	.4	.2	.4	31.3	(2)	15.2	59	146	26.7	85	280	43	67	16.7

See footnotes at end of table.

Provisional mortality from certain causes in the first 6 months of 1943, with comparative provisional data for the corresponding period in preceding years—Continued

State and period	All causes, rate per 1,000 population (annual basis)	Births (exclusive of stillbirths) per 1,000 population (annual basis)	Rate per 1,000 live births		Death rate per 100,000 population (annual basis)																				
			Total infant mortality	Maternal mortality	Typhoid and paratyphoid fever (1-2)	Dysentery (27)	Diarrhea and enteritis under 2 years (119)	Scarlet fever (8)	Diphtheria (10)	Whooping cough (9)	Measles (35)	Cerebrospinal (meningococcus) meningitis (6)	Acute poliomyelitis and polioencephalitis (36)	Acute infectious encephalitis (lethargic) (37)	Tuberculosis, all forms (13-22)	Syphilis (30)	Influenza (grippe) (33)	Pneumonia, all forms (107-109)	Cancer, all forms (45-55)	Diabetes mellitus (61)	Intracranial lesions of vascular origin (83)	Diseases of the heart (90-95)	Nephritis, all forms (130-132)	All accidents, including automobile accidents (169-195)	Automobile accidents (170 a, b, c)
37 STATES—Continued																									
Missouri.[8]																									
1943	13.1	23.9	37	1.8	0.4	0.7	2.8	0.9	2.4	0.9	1.6	2.8	0.5	0.9	44.7	14.8	17.5	114	141	29.3	109	390	130	68	12.5
1942	13.4	20.2	41	3.2	.3	.2	2.6	.5	1.1	1.5	1.9	.5	.4	.7	46.3	16.7	19.0	112	157	28.4	119	362	131	75	23.4
1941	13.3	20.1	48	2.5	.3	(2)	2.1	.9	1.3	5.6	3.4	.6	.5	1.0	51.2	(2)	79.0	125	134	32.9	110	345	118	71	21.6
Montana:																									
1943	12.1	23.4	46	2.1	.4	2.1	5.4	.8	.8	3.7	2.1	.8	(7)	1.3	41.5	8.7	9.5	63	119	20.3	95	324	63	136	19.5
1942	10.8	21.5	41	2.2	(7)	(7)	2.3	1.2	1.6	1.2	(7)	1.2	(7)	.8	39.2	13.3	8.2	58	118	13.7	106	285	63	80	21.5
1941	10.7	21.4	40	1.1	.4	(2)	3.4	2.3	2.6	1.1	.4	.4	1.5	.7	41.3	(2)	29.7	59	108	16.5	101	264	61	86	28.1
Nebraska:																									
1943	11.0	19.9	39	1.7	(7)	.2	1.7	.8	.7	1.8	2.4	1.2	.2	.3	16.7	8.8	15.6	49	137	33.7	105	322	83	63	12.7
1942	10.0	17.6	34	2.3	(7)	.2	1.5	.3	.8	1.0	1.0	.3	.2	.3	12.2	9.7	15.1	40	136	29.2	97	290	69	67	16.1
1941	10.0	16.7	37	2.5	.2	(2)	1.6	.2	.2	2.5	.6	.5	.6	.6	17.7	(2)	41.0	48	130	26.0	115	252	71	57	15.9
Nevada:																									
1943	11.5	20.0	52	4.0	(7)	1.5	6.1	(7)	(7)	4.0	(7)	2.7	(7)	(7)	46.4	17.2	.6	85	85	15.9	65	302	45	171	33.1
1942	12.9	17.3	55	(7)	1.5	3.0	8.9	1.5	(7)	10.4	1.5	3.0	1.5	3.0	62.3	10.4	3.9	65	108	13.4	97	333	49	229	74.2
1941	12.3	16.1	42	3.0	4.9	(2)	3.4	(7)	(7)	1.6	(7)	(7)	(7)	1.6	59.0	(2)	9.8	47	116	14.8	64	289	53	174	77.0
New Jersey:																									
1943	12.1	19.7	35	1.8	.1	.1	4.2	.4	.3	1.1	1.0	4.0	.1	.5	48.4	8.1	8.9	56	143	39.0	105	428	75	64	15.1
1942	11.1	17.3	33	2.0	.1	.2	(2)	.2	(7)	.6	.3	.4	.1	.6	44.5	9.6	4.1	48	150	38.2	93	379	72	63	19.1
1941	11.4	14.7	38	2.2	.1	(2)	2.4	.3	.0	.6	1.1	.3	1.	.3	45.3	(2)	8.9	54	147	38.3	99	376	84	62	20.1
New Mexico:																									
1943	10.6	29.5	81	5.2	.7	5.3	26.3	(7)	1.1	6.3	4.9	1.1	.4	(7)	72.8	11.6	16.0	70	71	11.6	42	130	44	132	21.3
1942	10.2	26.5	92	2.6	.8	3.0	13.7	(7)	2.3	10.3	11.4	.4	.8	1.1	61.8	12.2	20.6	85	53	6.9	47	140	52	75	26.7
1941	10.6	27.9	85	3.7	1.9	(2)	18.0	.4	2.7	11.4	15.7	(7)	.4	.8	73.8	(2)	25.1	69	56	12.2	44	124	54	88	39.5
New York:																									
1943	13.2	20.3	34	1.9	.1	.2	3.8	.3	.2	1.5	1.1	3.5	.1	1.3	52.2	14.9	4.3	62	175	45.4	89	493	68	64	11.5
1942	11.7	17.5	33	2.0	.1	.2	2.8	.2	.1	.9	.2	1.0	.1	.8	50.5	15.4	2.3	46	174	41.8	78	428	62	61	16.0
1941	11.9	15.5	35	2.3	.2	(2)	2.7	.3	.0	.8	.6	.6	.0	1.0	50.2	(2)	6.8	56	162	44.7	78	429	66	60	16.5

North Carolina:																									
1943	8.5	26.2	48	3.5	.2	1.4	6.5	.2	1.1	2.8	.6	1.7	.2	.2	42.2	7.2	14.9	58	64	12.6	90	178	81	55	17.0
1942	8.5	23.7	54	3.8	.3	1.2	7.9	.3	.7	4.1	2.9	.5	.1	.2	47.4	7.9	12.3	62	59	13.8	88	171	84	68	25.8
1941	9.6	23.7	64	4.8	.6	(2)	7.8	.3	1.6	6.4	4.4	.5	.3	.4	51.0	(2)	46.8	77	58	14.5	85	169	90	71	33.0
North Dakota:																									
1943	8.9	26.2	32	2.6	1.1	(7)	3.3	(7)	.7	(7)	.4	1.1	.4	1.1	19.3	4.5	7.1	42	104	24.1	89	253	60	54	9.7
1942	7.4	19.5	42	3.2	.3	.7	7.9	.3	(7)	2.1	2.4	.3	(7)	2.1	24.5	2.1	6.6	37	90	19.0	80	192	37	43	10.7
1941	8.9	22.7	45	2.8	(7)	(2)	3.9	.7	1.6	2.3	.7	(7)	.3	1.3	20.7	(2)	18.7	48	92	21.4	77	223	47	68	13.5
Ohio:																									
1943	12.0	20.2	41	2.1	.3	.2	3.6	5	.6	2.0	1.7	1.3	.1	.5	41.4	13.1	15.1	63	140	36.2	126	367	77	77	16.6
1942	[illegible]	18.1	40	2.1	.3	2	3.2	.5	.3	2.2	8	.2	.1	.1	41.7	11.7	11.8	54	135	32.6	109	335	79	80	27.8
1941	11.6	15.7	43	2.8	.3	(2)	3.5	.3	.2	2.8	2.9	.2	.3	.7	43.9	(2)	23.7	55	137	31.8	109	332	79	83	29.9
Oklahoma:																									
1943	8.8	18.1	52	2.7	.8	1.2	3.3	3	1.3	4.8	.4	2.5	.3	.5	43.2	9.9	15.1	52	84	17.1	91	192	56	62	12.2
1942	10.7	23.5	42	3.5	1.2	1.6	1.8	.3	2.2	2.5	8.7	.5	.7	5	55.7	7.7	19.4	66	103	19.6	98	225	64	85	20.4
1941	9.6	19.8	56	3.1	.9	(2)	2.2	.4	2.5	7.5	1.2	.4	.5	.4	50.4	(2)	41.8	72	86	17.3	84	204	61	59	20.6
Pennsylvania:																									
1943	12.2	21.4	37	1.9	.3	.3	4.0	4	.3	2.2	9	2.2	.2	.0	41.5	11.5	10.1	57	134	38.6	101	397	97	54	11.3
1942	11.7	19.9	39	1.9	.3	.1	3.8	4	.1	1.5	8	.8	.1	.3	40.4	11.2	8.2	48	129	35.4	92	364	91	51	16.8
1941	11.5	17.9	41	2.4	.4	(2)	3.4	.4	.3	1.6	1.9	3	.2	.8	42.9	(2)	18.4	55	126	38.8	92	372	95	56	16.8
Rhode Island:																									
1943	13.0	20.8	47	2.1	(7)	.3	7.1	5	3	1.1	.3	10.4	.5	1.4	37.2	10.4	5.5	75	157	51.6	103	441	109	67	9.8
1942	11.1	17.7	43	2.2	3	(7)	11.2	.3	5	8	8	3	(7)	.3	35.4	10.6	3.0	60	138	38.9	105	375	84	57	12.0
1941	11.8	15.4	40	2.2	(7)	(2)	2.8	.3	(7)	3	3	.3	(7)	.6	44.1	(2)	10.3	61	153	43.0	90	407	115	49	8.9
South Carolina:																									
1943	7.3	22.6	50	4.4	.8	2.0	3.6	1	.6	2.4	6	2.2	.5	2	33.5	11.9	16.6	51	43	10.6	78	137	78	54	9.2
1942	8.7	20.0	70	5.7	1.8	1.4	6.9	(7)	1.8	5.1	3.2	8	1	(7)	37.8	12.3	20.1	65	53	12.8	90	171	98	58	20.6
1941	10.5	21.0	84	5.8	1.6	(2)	3.8	.4	6	11.3	10.5	1.2	.1	(7)	44.5	(2)	57.3	83	53	14.3	92	191	87	72	30.0
South Dakota:																									
1943	9.8	24.2	34	1.1	.3	.3	1.7	1.4	1.7	2.1	7.6	7	(7)	.7	30.3	3.4	11.3	56	108	22.0	93	238	56	84	8.9
1942	9.4	20.4	41	2.2	7	(7)	2.4	.3	3.4	7.9	(7)	1.4	(7)	(7)	28.9	6.9	7.9	56	108	18.9	94	231	57	67	17.5
1941	9.4	19.4	48	1.9	.3	(2)	2.0	.3	1.6	3.9	3	.3	(7)	.6	31.5	(2)	23.3	55	106	30.2	88	223	57	64	16.1
Tennessee:																									
1943	9.4	22.6	45	3.2	.7	1.0	4.6	.2	.8	7.0	2.3	2.1	.1	.4	68.1	12.7	24.2	60	82	13.2	90	193	63	67	14.5
1942	9.4	18.8	55	3.1	.3	1.0	3.6	.7	.5	2.3	1.9	.5	6	.5	73.8	12.1	24.5	69	76	13.4	86	189	62	62	17.8
1941	10.2	17.7	60	4.0	.8	(2)	5.3	4	8	6.5	7.5	1.2	.3	.8	84.8	(2)	56.6	82	80	14.4	81	184	67	58	19.3
Texas:																									
1943	8.7	(2)	(2)	(2)	.8	4.6	18.6	2	2.1	5.0	8	1.0	1.1	.2	47.6	12.6	13.4	43	78	13.0	69	197	61	77	16.5
1942	8.8	(2)	(2)	(2)	1.1	(2)	16.3	.4	1.8	2.5	2.8	.7	.4	.3	55.6	(2)	19.0	49	77	13.4	65	196	61	70	21.2
1941	9.6	(2)	(2)	(2)	1.5	(2)	14.9	.1	1.5	4.5	2.0	.5	.7	.4	60.6	(2)	48.9	57	77	13.7	61	197	66	71	26.7
Utah:																									
1943	8.4	28.0	34	1.5	(7)	(7)	1.7	(7)	(7)	1.0	4.1	3.2	1.0	(7)	11.4	4.8	8.3	44	82	20.3	57	258	55	73	15.6
1942	8.1	24.4	35	1.6	.3	7	2.5	1.0	(7)	.3	1.8	(7)	(7)	.4	11.9	4.9	10.2	35	88	13.2	57	246	53	72	24.0
1941	8.2	23.7	31	1.1	4	(2)	3.7	(7)	(7)	2.1	(7)	.4	(7)	.4	12.2	(2)	15.0	31	77	22.2	59	259	52	71	28.3
Vermont:																									
1943	13.7	20.6	44	2.1	(7)	(7)	3.1	(7)	(7)	3.1	8.7	.6	(7)	(7)	33.4	7.4	24.8	82	148	35.9	126	405	76	66	8.7
1942	12.1	19.1	47	2.2	.1	.6	4.7	.6	6	3.5	6	.6	(7)	(7)	33.6	4.7	10.0	57	145	30.7	127	391	84	34	11.8
1941	12.3	18.7	53	2.8	.6	(2)	5.7	.6	(7)	(7)	1.2	1.7	(7)	(7)	40.7	(2)	26.4	61	144	29.9	125	409	93	52	15.0
Virginia:																									
1943	9.6	21.0	52	3.4	2	1.0	3.6	.4	1.0	3.3	7	4.7	.1	.5	46.9	12.9	14.7	62	74	16.9	99	231	84	71	15.7
1942	9.7	19.0	59	3.2	.5	1.6	4.1	.4	1.0	3.9	.9	1.7	.2	.5	54.0	14.9	14.9	64	77	17.5	99	230	79	70	22.7
1941	11.4	18.9	73	4.4	.4	(2)	4.9	.3	1.1	8.5	10.1	1.3	.3	.1	63.0	(2)	47.5	78	82	20.1	103	263	101	82	30.4

See footnotes at end of table.

Provisional mortality from certain causes in the first 6 months of 1943, with comparative provisional data for the corresponding period in preceding years—Continued

State and period	All causes, rate per 1,000 population (annual basis)	Births (exclusive of stillbirths) per 1,000 population (annual basis)	Rate per 1,000 live births: Total infant mortality	Rate per 1,000 live births: Maternal mortality	Death rate per 100,000 population (annual basis): Typhoid and paratyphoid fever (1–2)	Dysentery (27)	Diarrhea and enteritis under 2 years (119)	Scarlet fever (8)	Diphtheria (10)	Whooping cough (9)	Measles (35)	Cerebrospinal (meningococcus) meningitis (6)	Acute poliomyelitis and polioencephalitis (36)	Acute infectious encephalitis (lethargic) (37)	Tuberculosis, all forms (13–22)	Syphilis (30)	Influenza (grippe) (33)	Pneumonia, all forms (107–109)	Cancer, all forms (45–55)	Diabetes mellitus (61)	Intracranial lesions of vascular origin (83)	Diseases of the heart (90–95)	Nephritis, all forms (130–132)	All accidents, including automobile accidents (169–196)	Automobile accidents (170 a, b, c)
37 STATES—Continued																									
Washington: [3]																									
1943	12.2	18.6	46	1.7	(7)	0.2	1.4	0.8	1.8	1.6	5.0	3.8	0.6	1.0	35.9	12.5	12.9	79	120	27.8	118	392	69	95	17.9
1942	11.0	15.5	44	2.4	0.2	(7)	1.7	.4	.4	1.5	.2	.2	.2	1.5	34.0	11.2	12.5	61	135	26.9	125	324	71	77	28.6
1941	12.5	13.8	41	2.9	(7)	(2)	(7)	.2	.2	1.8	.2	.4	.9	1.8	41.9	(2)	24.0	48	127	25.1	92	331	67	87	31.6
Wisconsin:																									
1943	11.1	21.2	37	2.4	.3	.3	3.2	.7	.3	1.6	1.4	1.1	.1	.7	25.9	6.2	10.4	52	147	33.7	114	342	66	63	11.1
1942	9.8	18.2	35	2.0	.1	(7)	2.1	1.0	.1	1.0	.4	.2	.1	.5	25.1	5.5	7.0	42	135	27.3	99	311	53	57	19.8
1941	10.1	16.7	41	2.9	.2	(2)	1.9	.7	.1	.8	1.3	.1	.1	.6	26.2	(2)	17.5	47	132	29.9	94	305	58	63	21.6
Wyoming:																									
1943	8.9	20.5	38	1.9	.8	(2)	.8	.8	(7)	.8	3.9	1.6	3.1	3.1	17.3	(2)	13.4	53	86	18.1	58	243	78	94	11.8
1942	8.8	19.9	49	3.6	(7)	(7)	.8	1.6	.8	2.4	2.4	.8	(7)	(7)	16.8	8.8	16.8	46	82	16.0	60	237	62	97	29.7
1941	8.4	19.0	50	2.5	(7)	(2)	2.4	.8	3.2	(7)	1.6	.8	(7)	3.2	11.2	(2)	35.3	49	67	11.2	75	202	70	92	36.9

[1] The District of Columbia is included as a State. Includes all of the States listed below except Rhode Island, Massachusetts, Washington, and Missouri.
[2] Data not available.
[3] These data are taken from the July 1943 Statistical Bulletin published by the Metropolitan Life Insurance Co. **The rates for 1943 are subject to correction as they are based on provisional estimates of lives exposed to risk.** Data do not include all diseases reported to the Public Health Service.
[4] Classified as diarrhea and enteritis, age not specified.
[5] International List (1940 titles 92, 93 c, d, e, 94 a, b, and 95 only.
[6] Chronic nephritis only.
[7] No deaths reported.
[8] First quarter only.

PREVALENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED JANUARY 22, 1944

Summary

The number of reported cases of influenza declined from 65,649 for the preceding week to 47,143 for the current week. Only one geographic area, the West North Central, reported a significant increase—from 3,087 to 5,588 cases. Iowa, reporting 5,112 cases, as compared with 1,839 cases during the preceding week, more than accounted for the net increase in this area. Declines were recorded for all other areas except the New England and Mountain, in which slight increases were reported. Of 46 States which reported cases of influenza for the 2 weeks, increased incidence was reported in only 10 States.

The total mortality, all causes, in 90 large cities, as reported by the Bureau of the Census, declined from 11,538 for the preceding week to 10,359 for the current week, representing a decrease in the excess mortality per 1,000 population (annual basis), as compared with the mean for the two preceding years, from 2.0 to 0.7.

The incidence of meningococcus meningitis declined during the week. A total of 522 cases was reported, as compared with 645 for the preceding week (the largest weekly number of record), and with a 5-year (1939–43) median of 52. Decreases occurred in all geographic sections except the West South Central. Increases occurred in only 5 of the 17 States reporting more than 10 cases each. States reporting 20 or more cases for the week are as follows (last week's figures in parentheses): *Increases*—Michigan 27 (22), Texas 30 (14); *decreases*—Massachusetts 23 (34), New York 68 (89), Ohio 31 (47), Illinois 26 (27), Tennessee 20 (21), California 31 (42); *no change*—Pennsylvania 41 (41). The cumulative total for the first 3 weeks of the year is 1,747, as compared with 943 for the same period of 1943 and a 5-year median of 155.

Both current and cumulative figures for measles and scarlet fever are above the corresponding 5-year medians and the figures for the preceding week, while those for diphtheria, poliomyelitis, smallpox, typhoid fever, and whooping cough continue below their respective medians.

Telegraphic morbidity reports from State health officers for the week ended January 22, 1944, and comparison with corresponding week of 1943 and 5-year median

In these tables a zero indicates a definite report, while leaders imply that, although none was reported, cases may have occurred.

Division and State	Diphtheria			Influenza			Measles			Meningitis, meningococcus		
	Week ended		Median 1939-43	Week ended		Median 1939-43	Week ended		Median 1939-43	Week ended		Median 1939-43
	Jan. 22, 1944	Jan. 23, 1943		Jan. 22, 1944	Jan. 23, 1943		Jan. 22, 1944	Jan. 23, 1943		Jan. 22, 1944	Jan. 23, 1943	
NEW ENGLAND												
Maine	2	0	0	21	5	5	126	29	29	4	10	0
New Hampshire	0	1	0	12	-----	-----	6	29	7	0	1	0
Vermont	0	0	0	221	-----	-----	28	330	13	0	0	0
Massachusetts	5	0	3	-----	-----	-----	409	425	364	23	8	1
Rhode Island	0	1	0	31	-----	-----	189	17	17	10	25	0
Connecticut	2	0	2	43	8	8	65	375	143	15	4	0
MIDDLE ATLANTIC												
New York	17	25	25	[1] 15	[1] 24	[1] 24	719	971	971	68	48	6
New Jersey	3	10	10	38	18	18	659	478	167	12	8	2
Pennsylvania	10	10	24	27	4	-----	1,107	2,077	1,214	41	12	3
EAST NORTH CENTRAL												
Ohio	7	8	8	475	18	18	1,525	82	82	31	9	2
Indiana	12	0	11	67	16	22	350	137	55	15	7	1
Illinois	13	8	24	267	11	34	494	177	104	26	8	1
Michigan [2]	14	5	12	55	4	5	1,011	129	465	27	9	0
Wisconsin	1	4	1	848	101	54	760	434	378	8	1	1
WEST NORTH CENTRAL												
Minnesota	1	3	1	5	-----	2	677	11	206	5	3	1
Iowa	2	3	3	5,112	15	10	131	95	95	3	1	0
Missouri	2	11	11	17	12	24	80	45	15	12	5	1
North Dakota	0	1	2	105	41	41	310	14	19	1	1	0
South Dakota	2	0	2	21	-----	-----	166	74	11	1	0	0
Nebraska	2	1	1	84	51	-----	10	69	43	1	2	0
Kansas	3	2	4	244	11	17	130	166	166	6	9	1
SOUTH ATLANTIC												
Delaware	3	1	0	-----	-----	-----	11	3	3	1	0	0
Maryland [2]	5	5	7	55	27	27	153	19	19	14	13	2
District of Columbia	2	0	2	44	6	6	36	17	7	4	2	0
Virginia	4	12	12	3,819	763	763	230	116	116	17	19	2
West Virginia	3	6	9	1,440	12	38	243	5	26	4	3	3
North Carolina	8	19	27	214	27	31	316	59	169	9	8	1
South Carolina	10	9	7	3,799	681	865	171	5	8	7	18	1
Georgia	1	4	10	767	66	143	207	10	52	11	2	0
Florida	3	7	8	71	13	13	106	12	12	11	3	1
EAST SOUTH CENTRAL												
Kentucky	2	6	7	879	16	29	25	284	65	10	3	1
Tennessee	5	9	9	845	78	87	182	36	49	20	6	1
Alabama	11	6	10	2,452	107	433	212	6	72	10	4	1
Mississippi [2]	4	6	8	-----	-----	-----	-----	-----	-----	3	11	1
WEST SOUTH CENTRAL												
Arkansas	3	10	10	1,345	148	186	52	63	61	1	0	0
Louisiana	4	7	7	5,603	7	12	18	57	24	5	11	1
Oklahoma	9	5	10	2,061	113	138	36	1	1	10	2	0
Texas	44	58	44	10,060	1,661	1,553	371	44	195	30	10	7
MOUNTAIN												
Montana	0	1	1	484	-----	9	297	54	54	0	2	0
Idaho	0	0	0	30	-----	-----	3	228	22	1	1	0
Wyoming	1	0	0	182	61	61	75	10	10	2	3	0
Colorado	1	12	9	788	57	73	168	158	64	2	0	0
New Mexico	3	3	1	20	2	21	2	15	25	0	0	0
Arizona	2	2	5	486	103	132	91	14	14	0	3	0
Utah [2]	0	3	0	1,945	7	75	10	343	38	2	7	0
Nevada	0	0	0	82	-----	-----	1	5	0	0	0	0
PACIFIC												
Washington	2	8	0	134	1	12	140	594	117	4	2	2
Oregon	1	0	2	396	33	53	71	308	116	4	22	0
California	18	20	20	1,434	59	112	273	177	248	31	30	4
Total	247	312	369	47,143	4,387	4,387	12,452	8,807	9,234	522	356	52
3 weeks	765	1,014	1,127	239,498	12,569	12,569	34,314	25,214	25,811	1,747	943	155

See footnotes at end of table.

Telegraphic morbidity reports from State health officers for the week ended January 22, 1944, and comparison with corresponding week of 1943 and 5-year median—Con.

Division and State	Poliomyelitis			Scarlet fever			Smallpox			Typhoid and paratyphoid fever [3]		
	Week ended		Median 1939–43	Week ended		Median 1939–43	Week ended		Median 1939–43	Week ended		Median 1939–43
	Jan. 22, 1944	Jan. 23, 1943		Jan. 22, 1944	Jan. 23, 1943		Jan. 22, 1944	Jan. 23, 1943		Jan. 22, 1944	Jan. 23, 1943	
NEW ENGLAND												
Maine	0	0	0	38	9	9	0	0	0	0	0	0
New Hampshire	0	0	0	22	5	9	0	0	0	0	0	0
Vermont	0	0	0	10	4	6	0	0	0	0	0	0
Massachusetts	0	1	0	287	363	195	0	0	0	1	1	1
Rhode Island	0	0	0	12	21	8	0	0	0	0	0	0
Connecticut	1	0	0	94	89	75	0	0	0	0	1	1
MIDDLE ATLANTIC												
New York	1	0	1	385	372	386	0	0	0	2	4	7
New Jersey	1	1	1	116	109	143	0	0	0	0	0	0
Pennsylvania	0	0	1	302	285	285	0	0	0	3	6	6
EAST NORTH CENTRAL												
Ohio	0	1	1	417	311	311	2	5	0	3	1	2
Indiana	1	2	0	115	100	127	2	4	3	9	1	1
Illinois	0	1	1	242	221	380	1	2	2	1	2	2
Michigan [2]	0	0	0	169	121	325	0	0	0	5	1	2
Wisconsin	1	0	0	210	276	166	0	0	10	0	1	0
WEST NORTH CENTRAL												
Minnesota	0	0	0	166	75	106	0	0	10	0	0	0
Iowa	0	0	0	147	49	63	1	0		1	7	1
Missouri	0	1	1	82	91	86	1	0	3	1	0	1
North Dakota	0	0	0	36	11	10	0	1	1	1	0	0
South Dakota	0	0	0	31	12	18	0	0	0	0	0	0
Nebraska	1	2	0	49	24	28	2	0	0	0	0	0
Kansas	0	0	0	112	71	89	1	2	2	0	0	0
SOUTH ATLANTIC												
Delaware	0	0	0	0	14	18	0	0	0	0	0	0
Maryland [2]	0	0	0	95	48	54	0	0	0	0	0	3
District of Columbia	0	0	0	50	28	18	0	0	0	0	4	0
Virginia	0	3	0	43	48	39	0	0	0	1	4	3
West Virginia	0	0	0	64	35	60	0	1	0	0	0	1
North Carolina	0	1	1	51	73	61	0	0	0	0	0	1
South Carolina	0	0	0	11	7	14	0	0	0	0	1	2
Georgia	0	0	0	14	24	24	0	1	0	2	2	2
Florida	0	0	0	10	21	3	0	0	0	1	1	0
EAST SOUTH CENTRAL												
Kentucky	0	0	0	60	56	76	0	0	0	2	2	1
Tennessee	1	1	1	115	88	88	0	0	0	2	0	2
Alabama	0	1	1	16	23	23	0	2	0	0	0	1
Mississippi [2]	1	0	0	8	15	13	1	1	0	0	0	0
WEST SOUTH CENTRAL												
Arkansas	0	0	0	3	6	9	0	0	0	0	0	3
Louisiana	2	0	1	4	12	12	0	1	0	2	7	7
Oklahoma	0	0	0	77	7	25	0	0	1	3	0	2
Texas	6	6	1	110	52	82	2	1	1	6	4	10
MOUNTAIN												
Montana	0	0	0	31	15	26	0	0	0	0	1	0
Idaho	0	0	0	29	14	14	0	0	0	0	0	0
Wyoming	0	0	0	2	65	7	0	0	0	0	0	0
Colorado	0	0	0	38	54	46	0	0	0	1	3	1
New Mexico	0	0	0	6	10	10	0	0	0	4	1	1
Arizona	0	1	0	8	11	8	0	0	0	2	0	0
Utah [2]	1	1	0	215	75	28	0	0	0	0	1	0
Nevada	0	0	0	0	0	0	0	0	0	0	0	0
PACIFIC												
Washington	2	1	1	213	27	38	0	0	0	0	0	2
Oregon	2	0	0	102	14	19	0	1	1	2	3	1
California	3	1	1	389	194	154	0	0	0	2	2	3
Total	24	25	28	4,806	3,655	3,981	13	22	52	57	61	89
3 weeks	90	105	103	12,130	10,749	10,749	37	103	142	174	155	243

See footnotes at end of table.

Telegraphic morbidity reports from State health officers for the week ended January 22, 1944, and comparison with corresponding week of 1943 and 5-year median—Con.

Division and State	Whooping cough, Week ended—Jan. 22, 1944	Whooping cough, Week ended—Jan. 23, 1943	Whooping cough, Median 1939-43	Week ended January 22, 1944: Anthrax	Dysentery: Amebic	Dysentery: Bacillary	Dysentery: Unspecified	Encephalitis, infectious	Leprosy	Rocky Mt. spotted fever	Tularemia	Typhus fever
NEW ENGLAND												
Maine	15	78	52	0	0	0	0	0	0	0	0	0
New Hampshire	2	2	3	0	0	0	0	0	0	0	0	0
Vermont	37	34	34	0	0	0	0	0	0	0	0	0
Massachusetts	107	206	210	0	0	0	0	1	0	0	0	0
Rhode Island	15	27	13	0	0	0	0	0	0	0	0	0
Connecticut	14	47	75	0	0	1	0	0	0	0	0	0
MIDDLE ATLANTIC												
New York	195	467	467	0	4	23	0	2	0	0	1	0
New Jersey	51	144	144	0	0	0	0	1	0	0	0	0
Pennsylvania	102	394	394	1	0	0	0	0	0	0	1	0
EAST NORTH CENTRAL												
Ohio	94	208	208	0	0	0	0	1	0	0	0	0
Indiana	14	16	28	0	0	0	0	0	0	0	0	1
Illinois	95	212	212	0	0	0	0	0	0	0	3	0
Michigan [2]	92	370	370	0	1	0	0	0	0	0	0	0
Wisconsin	84	201	201	0	0	0	0	0	0	0	0	0
WEST NORTH CENTRAL												
Minnesota	35	67	67	0	3	0	0	0	0	0	0	0
Iowa	22	28	28	0	0	0	0	0	0	0	0	0
Missouri	4	9	15	0	0	0	0	0	0	0	0	0
North Dakota	3	0	17	0	0	0	0	0	0	0	0	0
South Dakota	0	7	5	0	0	0	0	0	0	0	0	0
Nebraska	23	6	6	0	0	0	0	0	0	0	0	0
Kansas	29	26	26	0	0	0	0	0	0	0	0	0
SOUTH ATLANTIC												
Delaware	0	11	7	0	0	0	0	0	0	0	0	0
Maryland [2]	16	76	76	0	0	0	0	2	0	0	0	1
District of Colombia	2	20	20	0	0	0	0	0	0	0	0	0
Virginia	107	110	45	0	0	0	17	0	0	0	3	0
West Virginia	66	59	59	0	0	0	0	0	0	0	0	0
North Carolina	119	146	250	0	0	0	0	0	0	0	0	1
South Carolina	60	21	41	0	0	2	0	0	0	0	0	3
Georgia	6	39	20	0	0	0	1	0	0	0	0	3
Florida	25	20	15	0	4	1	0	1	0	0	0	6
EAST SOUTH CENTRAL												
Kentucky	51	27	27	0	0	0	0	0	0	0	0	0
Tennessee	33	87	42	0	1	0	0	0	0	0	1	0
Alabama	15	21	21	0	0	0	0	0	0	0	0	3
Mississippi [2]	----	----	----	0	0	0	0	0	0	0	0	2
WEST SOUTH CENTRAL												
Arkansas	15	61	14	0	2	10	0	0	0	0	1	0
Louisiana	3	5	4	0	2	0	0	0	0	0	0	3
Oklahoma	3	13	13	0	0	0	0	1	0	0	0	0
Texas	140	288	111	0	8	136	0	1	2	0	0	16
MOUNTAIN												
Montana	5	32	16	0	0	0	0	0	0	0	0	0
Idaho	2	2	5	0	0	0	0	0	0	0	0	0
Wyoming	10	10	10	0	0	0	0	0	0	0	0	0
Colorado	30	34	34	0	0	0	0	1	0	0	0	0
New Mexico	4	29	32	0	0	0	0	0	0	0	0	0
Arizona	24	9	15	0	0	0	19	0	0	0	0	0
Utah [2]	14	30	50	0	0	0	0	0	0	0	0	0
Nevada	1	1	0	0	0	0	0	0	0	0	0	0
PACIFIC												
Washington	47	16	30	0	1	0	0	0	0	0	0	0
Oregon	29	8	21	0	0	0	0	0	0	0	0	0
California	61	411	222	0	1	4	0	0	0	0	0	0
Total	1,921	4,135	4,537	1	27	177	37	11	2	0	10	39
3 weeks	5,051	12,037	12,546	3	81	810	159	30	2	0	42	156
3 weeks, 1943	------	------	------	4	61	415	98	25	1	1	70	218

[1] New York City only.
[2] Period ended earlier than Saturday.
[3] Including paratyphoid fever cases reported separately as follows: Massachusetts, 1; Michigan, 3; Florida, 1; Tennessee, 1; Texas. 1.

WEEKLY REPORTS FROM CITIES

City reports for week ended January 8, 1944

This table lists the reports from 86 cities of more than 10,000 population distributed throughout the United States, and represents a cross section of the current urban incidence of the diseases included in the table.

	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
NEW ENGLAND												
Maine:												
Portland	0	0	7	1	0	0	9	0	1	0	0	
New Hampshire:												
Concord	0	0	------	0	0	0	3	0	1	0	0	[illegible]
Vermont:												
Barre	0	0	------	0	0	0	0	0	0	0	0	[illegible]
Massachusetts:												
Boston	1	0	------	6	31	6	35	0	57	0	1	[illegible]
Fall River	1	0	------	3	0	2	4	0	3	0	0	[illegible]
Springfield	0	0	------	0	43	1	2	0	7	0	0	[illegible]
Worcester	0	0	------	2	13	2	28	0	55	0	0	[illegible]
Rhode Island:												
Providence	0	0	32	1	74	1	12	1	4	0	0	[illegible]
Connecticut:												
Bridgeport	0	0	11	3	1	1	12	0	2	0	0	[illegible]
Hartford	1	0	6	0	0	1	2	0	15	0	0	
New Haven	0	0	2	3	4	1	9	0	1	0	0	[illegible]
MIDDLE ATLANTIC												
New York:												
Buffalo	0	0	3	6	1	3	11	0	5	0	0	[illegible]
New York	4	0	70	28	525	43	219	0	155	0	1	[illegible]
Rochester	0	0	------	1	0	3	8	0	4	0	0	[illegible]
Syracuse	1	0	------	0	0	1	8	0	10	0	0	[illegible]
New Jersey:												
Camden	0	0	4	3	0	0	6	0	4	0	0	
Newark	0	0	16	3	1	4	24	0	8	0	0	[illegible]
Trenton	0	0	12	4	0	2	8	0	1	0	0	[illegible]
Pennsylvania:												
Philadelphia	3	0	29	21	7	14	56	0	32	0	0	[illegible]
Pittsburgh	3	0	64	47	263	12	75	0	18	0	0	[illegible]
Reading	0	0	------	3	1	2	8	0	1	0	0	[illegible]
EAST NORTH CENTRAL												
Ohio:												
Cincinnati	4	0	18	5	0	9	14	0	42	0	0	
Cleveland	0	0	59	23	274	15	40	0	46	0	0	1
Columbus	0	0	371	12	19	2	9	0	4	0	0	
Indiana:												
Fort Wayne	0	0	------	1	31	0	5	0	2	0	0	[illegible]
Indianapolis	1	0	------	6	0	9	26	0	21	0	0	[illegible]
South Bend	0	0	------	0	38	0	0	0	0	0	0	[illegible]
Terre Haute	3	0	------	4	1	0	3	0	0	0	0	[illegible]
Illinois:												
Chicago	1	0	28	6	16	26	50	0	67	0	0	[illegible]
Springfield	0	0	3	0	18	0	3	0	5	0	0	[illegible]
Michigan:												
Detroit	0	0	14	13	10	11	40	0	44	0	0	[illegible]
Flint	0	0	------	2	3	0	7	0	1	0	0	[illegible]
Grand Rapids	0	0	------	1	75	0	7	0	5	0	0	[illegible]
Wisconsin:												
Kenosha	0	0	------	2	0	0	1	0	5	0	0	[illegible]
Milwaukee	0	0	3	3	14	3	7	0	49	0	0	[illegible]
Racine	0	0	------	1	0	0	0	0	4	0	0	[illegible]
Superior	0	0	1	1	55	0	3	0	1	0	0	[illegible]
WEST NORTH CENTRAL												
Minnesota:												
Duluth	0	0	------	3	6	2	7	0	9	0	0	[illegible]
Minneapolis	8	0	------	7	70	1	11	0	20	0	0	
St. Paul	0	0	------	4	57	1	10	0	18	0	0	[illegible]
Missouri:												
Kansas City	0	0	3	6	0	3	8	0	17	0	0	[illegible]
St. Joseph	0	0	------	0	0	0	0	0	3	0	0	[illegible]
St. Louis	0	0	56	8	29	12	34	0	17	0	0	[illegible]
North Dakota:												
Fargo	0	1	------	1	55	2	0	0	2	0	0	[illegible]
Nebraska:												
Omaha	2	0	------	4	0	1	12	0	14	0	0	[illegible]
Kansas:												
Topeka	0	0	------	5	1	1	7	0	3	0	0	[illegible]
Wichita	0	0	2	2	16	0	6	0	3	0	0	[illegible]

City reports for week ended January 8, 1944—Continued

	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
SOUTH ATLANTIC												
Delaware:												
Wilmington	0	0	------	1	18	0	6	0	1	0	0	0
Maryland:												
Baltimore	8	0	27	16	69	6	32	0	26	0	0	6
Cumberland	0	0	2	0	0	0	1	0	2	0	0	0
Frederick	0	0	2	0	1	0	1	0	0	0	0	0
District of Columbia:												
Washington	0	0	1,138	2	29	5	22	0	34	0	0	6
Virginia:												
Lynchburg	0	0	122	0	55	3	7	0	1	0	0	11
Richmond	0	0	5	2	12	0	8	0	3	0	0	0
Roanoke	0	0	-	2	2	0	[illegible]	0	0	0	0	11
West Virginia:												
Wheeling	0	0	19	0	0	0	7	0	1	0	0	0
North Carolina:												
Winston-Salem	0	0	1	1	100	0	3	0	4	0	0	1
South Carolina:												
Charleston	0	0	744	1	16	0	4	0	1	0	0	1
Georgia:												
Atlanta	0	0	475	8	4	1	9	0	4	0	0	0
Brunswick	0	0		0	36	4	3	0	1	0	0	0
Savannah	0	0	604	9	0	2	3	0	0	0	0	0
EAST SOUTH CENTRAL												
Tennessee:												
Memphis	1	0	27	8	2	4	14	0	11	0	0	2
Nashville	0	0	- -	7	1	1	6	0	7	0	0	8
Alabama:												
Birmingham	0	0	32	8	9	2	13	0	2	0	1	0
Mobile	0	0	762	5	0	0	6	0	0	0	0	0
WEST SOUTH CENTRAL												
Arkansas:												
Little Rock	0	0	163	0	5	0	8	0	0	0	0	0
Louisiana:												
New Orleans	3	0	161	11	6	11	14	1	4	0	0	1
Shreveport	0	0	------	1	0	0	15	0	2	0	1	0
Texas:												
Dallas	0	0	13	13	0	0	11	0	0	0	0	1
Galveston	0	0	------	0	0	0	0	0	2	0	0	0
Houston	1	0	---	3	1	0	19	0	3	0	0	0
San Antonio	1	1	13	11	0	0	19	0	0	0	0	2
MOUNTAIN												
Montana:												
Billings	0	0	------	4	0	0	0	1	1	0	0	0
Great Falls	0	0	407	0	19	0	0	1	7	0	0	5
Helena	0	0	------	0	0	0	0	0	1	0	0	0
Missoula	1	0	240	1	0	1	2	0	2	0	0	0
Idaho:												
Boise	0	0	105	0	0	0	3	0	2	0	0	0
Colorado:												
Denver	1	0	25	5	6	1	12	0	13	0	0	9
Pueblo	0	0	------	0	73	0	2	0	1	0	0	3
Utah:												
Salt Lake City	0	0	304	3	1	1	3	0	26	0	0	1
PACIFIC												
Washington:												
Seattle	0	0	------	8	1	2	21	0	7	0	0	8
Spokane	0	0	3	2	30	1	7	0	35	0	0	1
Tacoma	0	0	8	8	3	1	7	0	25	0	0	3
California:												
Los Angeles	4	0	377	12	30	3	10	0	31	0	0	7
Sacramento	0	0	184	3	5	1	5	0	2	0	0	0
San Francisco	0	0	326	8	18	8	26	4	17	0	0	1
Total	43	2	7,103	418	2,304	255	1,187	8	1,065	0	4	291
Corresponding week, 1943	86	2	311	53	2,554	84	575	8	1,158	1	11	1,185
Average, 1939-43	102	------	1,830	[1] 68	[2] 2,102	------	[1] 533	------	1,063	10	15	1,067

Dysentery, amebic.—Cases: Boston, 2.

Dysentery, bacillary.—Cases: Worcester, 16; New York, 1; Detroit, 3; Charleston, S. C., 1; Los Angeles, 10.

Dysentery, unspecified.—Cases: Baltimore, 2; San Antonio, 4.

Typhus fever.—Cases: New York, 1; Savannah, 2; Birmingham, 2; New Orleans, 2; Shreveport, 1; San Antonio, 1.

[1] 3-year average, 1941-43.

[2] 5-year median.

Rates (annual basis) per 100,000 population, by geographic groups, for the 86 cities in the preceding table (estimated population, 1942, 34,506,700)

	Diphtheria case rates	Encephalitis, infectious, case rates	Influenza		Measles case rates	Meningitis, meningococcus, case rates	Pneumonia death rates	Poliomyelitis case rates	Scarlet fever case rates	Smallpox case rates	Typhoid and paratyphoid fever case rates	Whooping cough case rates
			Case rates	Death rates								
New England	7.5	0.0	144	47.2	412	37.3	288.2	2.5	363	0.0	2.5	57
Middle Atlantic	4.9	0.0	88	51.7	356	37.5	188.7	0.0	106	0.0	0.4	27
East North Central	5.3	0.0	290	46.7	324	43.8	125.5	0.0	173	0.0	0.0	60
West North Central	9.8	2.0	119	78.2	457	44.9	185.7	0.0	207	0.0	0.0	31
South Atlantic	5.5	0.0	5,781	77.4	630	38.7	211.8	0.0	144	0.0	0.0	66
East South Central	5.9	0.0	4,876	166.3	71	41.6	231.6	0.0	119	0.0	5.9	59
West South Central	14.7	2.9	1,027	114.4	35	32.3	252.3	2.9	32	0.0	2.9	12
Mountain	16.1	0.0	8,690	104.5	796	24.1	176.9	16.1	426	0.0	0.0	145
Pacific	7.0	0.0	1,569	71.7	152	28.0	132.8	7.0	204	0.0	0.0	35
Total	6.5	0.3	1,073	63.2	348	38.5	179.4	1.2	161	0.0	0.6	44

TERRITORIES AND POSSESSIONS

Panama Canal Zone

Notifiable diseases—November 1943.—During the month of November 1943, certain notifiable diseases were reported in the Panama Canal Zone and terminal cities as follows:

Disease	Panama		Colon		Canal Zone		Outside the Zone and terminal cities		Total	
	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths
Chickenpox					3		4		7	
Diphtheria	5								5	
Dysentery (amebic)	1		2				6	1	9	1
Dysentery (bacillary)			3		3		2	1	8	1
Leprosy								1		1
Malaria [1]	8	1	4		117		67	1	196	2
Measles					2		5		7	
Meningitis, meningococcus					2	1			2	1
Mumps	24		6		73		5		108	
Paratyphoid fever	1						2		3	
Pneumonia		6		3	16			4	[2] 16	13
Scarlet fever			2						2	
Tuberculosis		23		5	4			6	[2] 4	34
Typhoid fever	1		1	1			1		3	1
Whooping cough					2				[2] 2	

[1] 48 recurrent cases.
[2] Reported in the Canal Zone only.

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—Week ended December 25, 1943.—During the week ended December 25, 1943, cases of certain communicable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox		5	1	83	418	37	43	66	47	700
Diphtheria		13	6	28	3	3	1			54
Dysentery (bacillary)									7	7
German measles					10		1	4	4	19
Influenza		363	11		326	9			1,623	2,332
Measles		2		218	192	3	1	35	8	454
Meningitis, meningococcus		2	2		3		1		1	9
Mumps		3	1	24	102	29	3	9	46	217
Scarlet fever		3	10	51	150	48	13	20	23	318
Tuberculosis (all forms)		7	8	41	49	4		36	40	185
Typhoid and paratyphoid fever				3						3
Undulant fever				3	2				1	6
Whooping cough		2		67	71	4	3	2	1	150

IRISH FREE STATE

Infectious diseases—1936–1941.—The following table shows the numbers of cases of certain infectious diseases reported in the Irish Free State together with the numbers of deaths and death rates per 100,000 population for the years 1936 to 1941, inclusive:

Disease	1936	1937	1938	1939	1940	1941
	Cases					
Diphtheria	2,569	2,511	2,983	2,097	1,891	1,447
Puerperal infection	135	98	116	76	97	99
Scarlet fever	5,368	4,476	3,992	2,779	2,465	2,318
Typhoid fever	287	413	254	385	253	284
Typhus fever	12	8		5	13	25
	Deaths					
Diphtheria	345	293	314	245	178	165
Puerperal infection	104	51	46	38	29	27
Scarlet fever	173	128	81	43	33	32
Typhoid fever	63	66	46	56	31	38
Typhus fever	2	4		3	2	6
	Deaths per 100,000 population					
Diphtheria	11.6	9.9	10.7	8.3	6.0	5.5
Puerperal infection	3.5	1.7	1.6	1.3	1.0	0.9
Scarlet fever	5.8	4.3	2.7	1.5	1.1	1.1
Typhoid fever	2.1	2.2	1.6	1.9	1.0	1.3
Typhus fever	0.1	0.1		0.1	0.1	0.2

NETHERLANDS

Diphtheria.—According to information dated January 12, 1944, diphtheria is said to have reached epidemic proportions in the Netherlands, where approximately 2,000 cases have been reported up to December 20, 1943.

WORLD DISTRIBUTION OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER

From medical officers of the Public Health Service, American consuls, International Office of Public Health, Pan American Sanitary Bureau, health section of the League of Nations, and other sources. The reports contained in the following tables must not be considered as complete or final as regards either the list of countries included or the figures for the particular countries for which reports are given.

CHOLERA

[C indicates cases]

NOTE.—Since many of the figures in the following tables are from weekly reports, the accumulated totals are for approximate dates.

Place		January–October 1943	November 1943	December 1943—week ended— 4	11	18	25
ASIA							
Ceylon	C	50					
China: Kwangsi Province	C	[1] 1,100					
India	C	243,033	35,920				
Bombay	C	28					
Calcutta	C	6,335	316	67		78	
Chittagong	C	282	91		4		
Cochin	C	192					
Madras	C	1,061	30	30	33		29
Negapatam	C	21					
Vizagapatam	C	63	5				
India (French)	C	55					
Chandernagor	C	8					
Karikal	C	30					
Pondichery	C	17					

[1] Cases reported up to Sept. 8, 1943, with a mortality rate of over 25 percent.

PLAGUE

[C indicates cases; D, deaths; P, present]

Place		January–October 1943	November 1943	December 1943—week ended— 4	11	18	25
AFRICA							
Basutoland	C	[1] 23					
Belgian Congo	C	[2] 18	8	2			
Plague-infected rats		P					
British East Africa:							
Kenya	C	17			1		
Uganda	C	18				1	1
Egypt	C	15	22	11	15	44	32
Port Said	C	7		1		2	
Suez	C		22	10	15	39	32
Madagascar	C	53	2				
Morocco (French)	C	251	4				
Senegal	C	244					
Dakar	C	32					
Union of South Africa	C	66	3				
ASIA							
India	C	4,953	1,857				
Indochina	C	31					
Palestine	C	12					
EUROPE							
Portugal (Azores).[3]							

[1] Includes 12 cases of pneumonic plague in a village south of Mafeteng.
[2] Includes 7 cases of pneumonic plague.
[3] A report dated Nov. 19, 1942, states that during 1942 there were 54 cases of plague including 3 pneumonic cases and 2 septicemic cases among the civil population and 2 additional cases among the military population of the Azores. In 1943 the number of cases is about the same as for the year 1942.

PLAGUE—Continued

[C indicates cases; D, deaths; P, present]

Place		January–October 1943	November 1943	December 1943—week ended— 4	11	18	25
SOUTH AMERICA							
Ecuador: Loja Province	C	2	1				
Peru:							
Ica Department	C		1				
Lambayeque Department	C	2					
Libertad Department	C	17					
Lima Department	C	15	4				
Lima	C	1					
Plague-infected rats		P					
Piura Department	C	5					
Venezuela	C	10					
OCEANIA							
Hawaii Territory:[4]							
Hamakua District	D	5					[4] 1
Plague-infected rats		[5] 75	8				

[4] On December 29, 1943, 1 death from plague was reported in Kukuihaele, Hamakua District, Island of Hawaii, making a total of 7 deaths from plague reported for the year 1943.
[5] Includes 4 plague-infected mice.

SMALLPOX

[C indicates cases; D, deaths]

Place		January–October 1943	November 1943	December 1943—week ended— 4	11	18	25
AFRICA							
Algeria	C	1,256					
Angola	C	631					
Basutoland	C	123	23				
Belgian Congo	C	3,748	438	57	45		
British East Africa:	C						
Kenya	C	1,936	647	175	138	242	137
Mombasa	C	3					
Tanganyika	C	60	23				
Uganda	C	49	33	13	9	7	
Dahomey	C	145					
Egypt	C	3,304	172				
French Guinea	C	372	5				
Gold Coast	C	21	4				
Ivory Coast	C	154	1				
Mauritania	C	40					
Morocco (French)	C	909	99				
Mozambique	C	1					
Nigeria	C	5,067	374		60	193	
Niger Territory	C	265	19				
Rhodesia, northern	C	114		3			
Senegal	C	74					
Sierra Leone	C	3					
Sudan (French)	C	3,654	30				
Tunisia	C	3					
Union of South Africa	C	596					
ASIA							
Arabia	C	1		1			
Ceylon	C	79	5		1		
India	C	37,714	4,274				
India (French)	C	10					
Indochina	C	4,643	180				
Iran	C	562	6				
Iraq	C	228	19		2	7	4
Palestine	C	104					
Syria and Lebanon	C	1,011	70	7	21	9	
Trans-Jordan	C	19					
EUROPE							
Belgium	C	1					
France	C	2					
Germany	C	1					
Gibraltar	C	1					
Portugal	C	42	3		3	1	1
Scotland	C	1	[1] 1				
Spain	C	214	2				
Switzerland	C	17					
Turkey	C	9,378	618				

[1] On a vessel from North Africa.

SMALLPOX—Continued

[C indicates cases; D, deaths]

Place		January–October 1943	November 1943	December 1943—week ended— 4	11	18	25
NORTH AMERICA							
British Honduras	C		1				
Canada	C	6					
Guatemala	C	27					
Mexico	C	336					
SOUTH AMERICA							
Brazil	C	49	4	1			
British Guiana	C	1					
Colombia	C	335	15	5	5		
Ecuador	C	22	3				
Peru	D	12					
Venezuela	C	95	9				

TYPHUS FEVER

[C indicates cases; D, deaths]

Place		January–October 1943	November 1943	December 1943—week ended— 4	11	18	25
AFRICA							
Algeria	C	8,190					
Basutoland	C	18	5				
Belgian Congo	C	39					
British East Africa:							
Kenya	C	3	1				
Mombasa	C	1					
Uganda	C	1					
Egypt	C	39,874	148				70
Gold Coast	C	9					
Morocco (French)	C	16,018	59				
Morocco (Spanish)	C	369					
Nigeria	C	11					
Portuguese East Africa	C	1					
Rhodesia, northern	C	10	4				
Senegal	C	2					
Dakar	C	21	4			3	
Sierra Leone	C	3					
Tunisia	C	266	31				
Union of South Africa	C	1,595					
ASIA							
Afghanistan	C	520					
China: Shanghai	C	12					
India	C	1,066					
Iran	C	9,176	11				
Iraq	C	1,423					
Palestine	C	296	24	11	1	4	4
Syria and Lebanon	C	89					
Trans-Jordan	C	17					
EUROPE							
Bulgaria	C	1,745				[1] 77	
France—Seine Department	C	2					
Germany	C	[2] 973					
Hungary	C	787	44		19	36	
Irish Free State	C	19	1				
Netherlands	C	1					
Portugal	C	9		2			
Rumania	C	7,157	224	143	152		
Slovakia	C	524	73	15		11	
Spain	C	582	9				
Turkey	C	3,995					
NORTH AMERICA							
Cuba	C	1					
Guatemala	C	1,112	103				
Jamaica	C	29	2	2			
Mexico	C	984					
SOUTH AMERICA							
Brazil	C	1					
Chile	C	220	12	3	2		
Colombia	D	2					
Ecuador	C	319	9				
Peru	C	14					
Venezuela	C	18					
OCEANIA							
Australia	C	96	10	3	6		
Hawaii Territory	C	52	7		3	4	

[1] For 5 weeks.

[2] For the period Jan. 1 to Apr. 30, 1943.

YELLOW FEVER

[C indicates cases; D, deaths; P, present]

Place		January–October 1943	November 1943	December 1943—week ended— 4	11	18	25
AFRICA							
Belgian Congo:							
Bondo	D	2	1				
Kinzao	D	1					
Leopoldville	C	2					
Stanleyville	D	1					
Yanonge	C	1					
British East Africa: Kenya—Kisumu	C		1				
Dahomey:							
Djougou District	C	[1] 2					
Natitingou	C	[1] 1					
French Guinea:							
Baccoro	C	1					
Dubreka	C	1					
Friguiagbe	C		1				
Matakang Island	D		1				5
Gold Coast: Asuboi	C	1					
Ivory Coast:							
Abidjan	C	1					
Toumodi	D		1				
Portuguese Guinea	C		P				3
Senegal:							
Goudiri	D		1				
Kolda	C	1					
Tambacounda	C	1	1				
Velingara Casamance	C		1				
Sierra Leone: Galinas	C			[1] 1			
SOUTH AMERICA							
Brazil: Para State	D	1					
Colombia:							
Boyaca Department	D	4			[2] 7		
Cundinamarca Department	D	3			[2] 1		
Intendencia of Meta	D	2			[2] 5		
Santander Department	D	1					

[1] Suspected.
[2] For the period Nov. 21 to Dec. 11, 1943.

DEATHS DURING WEEK ENDED JANUARY 15, 1944

[From the Weekly Mortality Index, issued by the Bureau of the Census, Department of Commerce]

	Week ended Jan. 15, 1944	Corresponding week, 1943
Data for 90 large cities of the United States.		
Total deaths	11,538	10,311
Average for 3 prior years	9,973	
Total deaths, first 2 weeks of year	24,860	21,017
Deaths under 1 year of age	672	751
Average for 3 prior years	634	
Deaths under 1 year of age, first 2 weeks of year	1,372	1,539
Data from industrial insurance companies.		
Policies in force	66,235,604	65,745,481
Number of death claims	16,383	14,619
Death claims per 1,000 policies in force, annual rate	12.9	11.9
Death claims per 1,000 policies, first 2 weeks of year, annual rate	11.9	10.9

×

FEDERAL SECURITY AGENCY

UNITED STATES PUBLIC HEALTH SERVICE

THOMAS PARRAN, *Surgeon General*

DIVISION OF PUBLIC HEALTH METHODS

G. ST. J. PERROTT, *Chief of Division*

The PUBLIC HEALTH REPORTS, first published in 1878 under authority of an act of Congress of April 29 of that year, is issued weekly by the United States Public Health Service through the Division of Public Health Methods, pursuant to the following authority of law: United States Code, title 42, sections 7, 30, 93; title 44, section 220.

It contains (1) current information regarding the prevalence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

The PUBLIC HEALTH REPORTS is published primarily for distribution, in accordance with the law, to health officers, members of boards or departments of health, and other persons directly or indirectly engaged in public health work. Articles of special interest are issued as reprints or as supplements, in which forms they are made available for more economical and general distribution.

Requests for and communications regarding the PUBLIC HEALTH REPORTS, reprints, or supplements should be addressed to the Surgeon General, United States Public Health Service, Washington, D. C. Subscribers should remit direct to the Superintendent of Documents, Washington, D. C.

Librarians and others should preserve their copies for binding, as the Public Health Service is unable to supply the general demand for bound copies. Indexes will be supplied upon request.

UNITED STATES GOVERNMENT PRINTING OFFICE, WASHINGTON : 1944

For sale by the Superintendent of Documents, Washington, D. C.

Price 5 cents. Subscription price $2.50 a year

Public Health Reports

VOLUME 59 FEBRUARY 4, 1944 NUMBER 5

IN THIS ISSUE

Sanitation Manual for Ground Water Supplies

CONTENTS

Public Health Reports

Vol. 59 • FEBRUARY 4, 1944 • *No. 5*

SANITATION MANUAL FOR PUBLIC GROUND WATER SUPPLIES

CONTENTS

Introduction

This manual has been prepared by the Public Health Service for the guidance of States, municipalities, and health districts in order to encourage a greater uniformity and a higher level of safety in the sanitary control of public ground water supplies.

The Public Health Service, in 1937, appointed a Water Sanitation Advisory Board to consider the formulation of a water supply section as a part of a general sanitation code. This Board at a number of meetings prepared some of the material necessary for a water supply section. In 1940, the Public Health Service undertook to prepare a code on ground water supplies utilizing much of the material formulated by the Sanitation Advisory Board. Several drafts of such a code were referred to the State health officers for review and comment.

Serious objections were voiced to the use of the ordinance and code form and the sentiment in general appeared to be that a manual or guide of recommended practice was preferable. This manual has been prepared with the thought of indicating desirable practice or, more correctly, minimum acceptable standards. The form followed in other Public Health Service manuals has been adopted in this manual, that is: statement of the requirement, the public health reason for the requirement, and what constitutes satisfactory compliance.

The word "shall" has been used throughout the manual to state what must be done to accomplish satisfactory compliance. Because this is a manual or guide, objection may be voiced to this terminology. However, the word "shall" has been used advisedly to permit adoption of the material without extensive editing and revision, if so desired. Where the manual is used as a guide in the preparation of other regulations or is revised to suit the needs of a particular health authority no harm will result from the use of the word "shall" throughout in this manual.

This manual will be subject to periodic review and revision for incorporation of such changes as will increase its usefulness.

SANITATION MANUAL FOR PUBLIC GROUND WATER SUPPLIES

Section 1. Definitions

1. Public water supply. A public water supply is one from which water may be distributed, sold, or made available to the people at large or to any considerable number of members of the public indiscriminately.

2. Public ground water supply. A public ground water supply is a public water supply which obtains water from subsurface sources.

3. Bottled water. Bottled water means any water distributed, sold, or made available to consumers in bottles or other containers.

4. Health officer. Health officer means the health officer of any State, municipality, or district which adopts these requirements, or his duly authorized representative.

5. Person. Person means an individual, a partnership, a public or private corporation, an association, a joint stock company, a trust, or an estate.

6. Cross-connection. Any physical connection whereby the approved supply is connected with any other water supply system whether public or private, either inside or outside of any building or buildings in such manner that a flow of water into the approved water supply is possible either through the manipulation of valves or because of ineffective check or back pressure valves, or because of any other arrangement.

7. Backflow connection. Any system of piping or other arrangement whereby the public water supply is connected directly with a sewer drain, conduit, pool, storage reservoir, or other device which does or may contain sewage or other waste or liquid which would be capable of imparting contamination to the approved water supply

8. Auxiliary intake. Any piping connection or other device whereby water may be secured from a source other than that normally used.

9. Bypass. Any system of piping or other arrangement whereby the water may be diverted around any part or portion of a water purification plant.

Section 2. Registration and Permits

From and after the date of adoption and publication of requirements for public ground water supplies by a State, municipality, or district, no person shall begin construction, alteration, or extension of any public ground water supply without first securing a written permit from the State health officer. Such permit shall be granted

by the State health officer only after examination and approval of detailed plans and specifications which shall have been submitted by said person, or after such survey of the site or installation as the State health officer may deem necessary.

Not later than 6 months after the adoption and publication of requirements for public ground water supplies by a State, municipality, or district, all persons who own or control any public ground water supply shall submit to the health officer a report giving such information relative to said water supply as may be required by the health officer.

Section 3. Inspections

At least once during each 12-month period the health officer shall inspect all public ground water supplies in his jurisdiction for the purpose of ascertaining which supplies shall be termed "Approved Public Ground Water Supplies."

In case the health officer discovers any violation of the requirements which have been adopted, he shall require correction of such violations in writing specifying the corrections to be made and the time allowed for making them. A second inspection shall be made after the lapse of the time allowed for the defects to be remedied and the second inspection shall determine whether or not the supply shall be "approved."

Section 4. Emergency Measures To Prevent Epidemics

Whenever, in the opinion of the health officer, conditions arise in connection with any public ground water supply which warrant emergency measures to prevent a water-borne disease epidemic, said health officer is authorized to apply such measures as he may deem necessary.

Section 5. Approved Public Ground Water Supplies

All "Approved Public Ground Water Supplies" shall conform with the following items of sanitation:

ITEM 1. EXCLUSION OF SURFACE WATER FROM SITE

The site of the source in all directions shall not be subject to flooding and shall be so graded and drained as to facilitate the rapid removal of surface water.

Public health reason.—The exclusion of flood waters from the site and proper drainage of surface water away from the source will help to prevent contaminated surface water from reaching the source directly. If flood waters are excluded for a given horizontal distance, such waters may reach the source only by passage through the soil in the intervening distance, thereby providing a factor of safety against direct pollution.

Satisfactory compliance.—This item shall be deemed to have been satisfied when:

(1) Pump platform, pump room floor, or cover of a ground water supply is not less than 2 feet above the highest known high water level of any nearby body of surface water. Where necessary the area should be filled and graded to the necessary height and filling protected from erosion by rip rap.

(2) Flood waters from nearby bodies of surface water are not allowed to approach within less than 50 feet of the source measured horizontally.

(3) The earth surfaces are sloped to drain away from or divert surface water around the spring, infiltration system, well, or pump house, and are so graded and maintained as to prevent the accumulation and retention of surface water within a distance of 50 feet from the source in all directions.

(4) For hillside sites, an adequate intercepting ditch or ditches are constructed around the uphill side of the source in such manner and so maintained as to keep hillside storm water at least 50 feet away from the source in all horizontal directions; the intercepting ditch or ditches may be protected against erosion by rip rap, con rete, or other equivalent ditch lining where necessary.

(5) The source is not located in a ravine where surface water flows may be obstructed or concentrated.

ITEM 2. SATISFACTORY EARTH FORMATIONS ABOVE THE WATER-BEARING STRATUM

The earth formations above the water-bearing stratum shall be of such character and depth as to exclude contamination from the source. If satisfactory sites are not available the water shall be treated by a method or methods approved by the health officer for the specific installation.

Public health reason.—The earth formations above the water-bearing stratum should be of such depth and character as to provide filtration sufficiently adequate to prevent contaminated surface water from reaching the source. Formations such as limestone, broken lava rock, coarse gravel, and brittle rocks whose interstices are in the form of channels, joints, and fissures provide little filtering action to prevent contamination from reaching the water-bearing stratum.

Satisfactory compliance.—This item shall be deemed to have been satisfied when:

(1) The earth formations overlying the water-bearing stratum (natural or fill) consist of one or more impervious formations such as clay, silt, stiff clay mixtures, fine sand, or equivalent materials having a combined depth of not less than 10 feet.

(2) The backfill above an infiltration system consists of not less than 10 feet of thoroughly compacted clay, silt, stiff clay mixtures, or equivalent materials.

(3) Treatment approved by the health officer is provided where satisfactory earth formations above the water-bearing stratum cannot be shown to exist. (Treatment may, of course, be required due to other unsatisfactory conditions even though satisfactory earth formations are known to exist).

ITEM 3. DISTANCES TO SOURCES OF CONTAMINATION

Every public ground water supply and all appurtenances thereto shall be located at a safe distance from all sources of contamination such as pit privies, cesspools, septic tanks, subsurface tile systems, sewers, drains, barnyards, and pits below the ground surface.

Public health reason.—The organisms of typhoid fever, dysentery, and other enteric diseases are present in the body wastes of persons sick with these diseases or who are carriers of the diseases. If sources of contamination are located near the water supply source, disease organisms may reach the latter.

Ground waters located in formations such as limestone, broken lava rock, coarse gravel, brittle rocks, or equivalent materials which are not protected against the penetration of contamination by an adequate overlying impervious formation are not suitable for public ground water supplies without treatment.

Satisfactory compliance.—This item shall be deemed to have been satisfied when:

(1) The distance from the water supply source to any means of contamination in all horizontal directions is not less than 50 feet. This minimum distance shall be used only where existing conditions indicate it to be sufficient; greater distances should be provided where local conditions indicate the need for greater protection.

(2) In case the area adjacent to the source is accessible to livestock, the site is completely surrounded by a fence located not less than 50 feet from the source in all horizontal directions. Drainage from areas accessible to livestock in the vicinity of water sources is away from the water source.

* * *

MINIMUM DISTANCES TO SOURCES OF CONTAMINATION

Because of the many factors involved in the determination of a "safe distance" from sources of contamination, the following information is given for the guidance of those concerned:

Every ground water supply source such as a well, spring, or infiltration system, and all appurtenances thereto, should be located at a safe distance from any cesspool, privy, septic tank, and tile field, sewer, soil pipe or pipe through which sewage may back up, or from any other possible source of pollution, and in such

manner as to prevent contamination of the water by either underground seepage or channels, or by surface drainage. Coarse gravel, limestone, disintegrated rock, or other porous material which will permit rapid flow of water through it are not suitable materials around a source of supply. When such formations are encountered, more suitable sites should be obtained. If satisfactory sites are not available, adequate treatment of the water should be provided.

The location of ground water supplies on a side hill or at the foot of a hill where cesspools, privies, sewers, or other sources of pollution are situated on the slope above and in the path of the ground water flow and within 300 feet should be avoided.

When a body of ground water tapped by a well is drawn upon, the level of the water in the well will be lowered, and the surface of the ground water adjacent to the well will assume a form similar to an inverted cone. The amount which the water level is lowered decreases rapidly at increasing distances from the well, until at some point, more or less remote, there is no perceptible effect. The area within which the level is lowered appreciably is called the circle of influence.

Where the rate of pumpage from a well exceeds the percolation of water through the water-bearing formation, the water level in the well will drop and the circle of influence will be broadened. For a specific well the draw-down or drop in water level and the diameter of the circle of influence will be much greater usually when pumped at high rates than when pumped at low rates. Because of this fact, ordinary wells which are developed and equipped to provide large volumes of water are more likely to become contaminated from sources of pollution located at greater distances as compared to wells supplying small volumes of water. It is essential, therefore, that the minimum distances between the well and sources of contamination be increased as the rate of pumpage from the well is increased.

The Minnesota Department of Health has developed a formula for computing approximate safe distances between wells and sources of contamination based on the character of the soil, the capacity of the pump, the permissible velocity through the soil, the slope of the surface or water table, and the length of the screen or depth of flow toward the well. This formula, and tables computed by its application, are presented here:

Let D = Distance between well and the source of contamination, in feet.
P = Pump rate, in gallons per minute.
L = Length of well screen, depth of flow toward well, or thickness of water-bearing formation, in feet.
S = Angle of slope of ground in degrees (approximately parallel to the water table).
K = Coefficient of flow depending on character of soil.

For fine sand:
$K = 0.11$ gallons per square foot per minute.

For medium sand:
$K = 0.07$ gallons per square foot per minute.

For coarse sand and gravel:
$K = 0.03$ gallons per square foot per minute.

When the distance D is such that the limiting velocity K is not exceeded, then the total flow = pump effect plus slope effect.

$$2\pi DLK = P + 2\pi DL (K \text{ sine } S)$$

Solving for D.

$$D = \frac{P}{2\pi LK (1 - \text{sine } S)}$$

This formula is not accurate beyond the limits of accuracy of the data used in it. It should not be taken to give definite safe distances, but it has been found useful in checking judgment of distances in the preliminary study of well sites. Careful consideration must always be given to the geological formations on the site especially where there may be faults, ledges, or impermeable dams that interfere with the expected movement of the water.

This formula can be used to develop tables for checking existing installations or decisions regarding new sites. For those who have an aversion to working out a mathematical formula, the table would be helpful. Skeleton tables can be set up and the formula used to fill in any intermediate conditions. To illustrate the working of the formula and table, the following is presented:

Let $P=500$ gallons per minute.
$L=15$
$K=0.11$
$S=0.$

$$D=\frac{500}{2\times3.14\times15\times.11}=50$$

For $S=8°$ $D=58$ feet, say 60 feet.
For $S=16°$ $D=68$ feet, say 70 feet

The formula can be used to determine the approximate safe distance for any combination of screen, pump, soil, and slope with the proviso that no distance shall be less than the 50, 40, and 30 feet that head the 500-gallons-per-minute table. Hand pumps and power pumps of small draft will fall, therefore, under this classification.

TABLE 1.—*Pump capacity 500 g. p. m.—15-foot screen*

Character of soil	Degree of slope	Type of structure containing pollution		
		Cesspools, privies, and clay pipe sewers	Cast-iron pipe, and metal tanks	Sewer connections with extra-cased special joints
		A	B	C
Silt and clay	0	50	40	30
Very fine sand	8	60	50	40
(0.1 mm. and less)	16	70	60	50
Fine sand to	0	75	65	55
Medium sand	8	90	80	70
(0.1 mm. to 0.5 mm.)	16	105	95	85
Coarse sand	0	175	165	155
Fine gravel and well filled mixed gravel	8	200	190	180
(0.5 mm. to 2.0 mm.)	16	240	230	220

TABLE 2.—*Pump capacity 1,000 g. p. m.—15-foot screen*

Character of soil	Degree of slope	Type of structure containing pollution		
		Cesspools, privies, and clay pipe sewers	Cast-iron pipe, and metal tanks	Sewer connections with extra-cased special joints
		A	B	C
Silt and clay / Very fine sand / (0.1 mm. and less)	0	100	90	80
	8	120	110	100
	16	140	130	120
Fine sand to / Medium sand / (0.1 mm. to 0.5 mm.)	0	150	140	130
	8	180	170	160
	16	210	200	190
Coarse sand / Fine gravel and well filled mixed gravel / (0.5 mm. to 2.0 mm.)	0	350	340	330
	8	400	390	380
	16	480	470	460

A—Computed by formula
B—Arbitrary deduction of 10 feet from A for reducing the possibility of contamination.
C—Deduction of 10 feet from B when amount of contamination escaping into the soil is further limited.
Column C represents the minimum distance for any type of construction.

The two paragraphs following are quoted from "Ground-Water Supplies. Progress Report of the Committee on Ground-Water Supplies Conference of State Sanitary Engineers, 1936" (Supplement No. 124 to the Public Health Reports).

"Toilets, sewers, floor drains, soil pipes, main drains, or other pipes which are connected directly to a storm or sanitary sewer, or through which water or sewage from any source may back up, should not be located nearer than 50 feet, horizontally, to any well, spring, infiltration system, pumping apparatus, suction main, air pipe, air compressor, filter, or other feature of any ground-water supply. In special cases, where it is impossible or not practical to obtain a 50-foot distance, special construction to provide additional safeguards is necessary. In no case shall such fixtures or piping be nearer than 30 feet to a well. All such sewers, drains, and pipes, or parts thereof, which must be more than 30 feet and which are less than 40 feet, horizontally, from any such water supply feature, should be constructed of extra heavy cast-iron pipe with tested watertight leaded joints. In this zone, joints should be further protected against leakage by a substantial slip-over sleeve extending at least 6 inches from each side of the joint. The annular space between the pipe and the sleeve shall be filled with asphalt or material such as sewer-joint compound, or closed with rubber gaskets. All such sewers as lie between 40 and 50 feet of the ground-water supply may be of extra heavy cast-iron pipe with tested watertight leaded joints. Toilets, sewers, soil pipes, or drains should not be located on the first floor directly above the pump-room floor, or where leakage therefrom can reach any source of water supply or pump room.

"Floor drains constructed of cast-iron pipe with leaded joints may be located as close as 2 feet to a ground-water supply, provided they do not connect to a storm or sanitary sewer, and provided they discharge only to the ground surface or to a gravel pocket, which is well removed from contact with sewage or other waste. The cast-iron pipe should be carried to a point at least 4 feet outside the building walls and connected to other suitable pipe which discharges at least 30 feet from the ground-water supply."

ITEM 4. MINIMUM DEPTH OF CASINGS AND CURBINGS

All well and spring basin casings or curbings shall extend a safe distance below the ground surface.

Public health reason.—A watertight casing or curbing which extends a safe distance below the ground surface is essential to insure exclusion of contaminated water from a well.

Satisfactory compliance.—This item shall be deemed to have been satisfied when:

(1) The watertight well casing or curbing extends to a minimum depth of not less than 10 feet below the ground surface and preferably 10 feet below the ground water table. The casing should be carried through an impervious stratum above the water-bearing stratum and a tight seal made between this impervious stratum and the well casing to exclude undesirable water strata and surface water. Where such impervious strata may not exist, the well should be grouted throughout its entire depth to seal off all but the water-bearing stratum from which water is to be drawn.

(2) The watertight casing for a driven point well extends the full depth of the well to the water-bearing stratum.

(3) In the case of springs, the water enters the inclosing structure of springs or infiltration systems at points 10 feet below the ground surface. In cases where the 10-foot distance is not obtainable without sealing, cutting off, or diverting the underground source, the springs may be protected by placing earth filling over the area involved (50-foot radius from the spring) to provide the necessary depth of 10 feet of earth over the points of flow. If this is impracticable, adequate treatment should be provided in accordance with the provisions of item 20 of this manual.

ITEM 5. CONSTRUCTION AND USE OF CASINGS AND CURBINGS

All ground water supplies shall have a properly constructed and installed outside watertight casing or curbing extending a safe distance above and below the ground surface.

Public health reason.—A properly constructed and installed watertight casing or curbing is essential to prevent the entrance of surface or subsurface contamination into the well.

Satisfactory compliance.—This item shall be deemed to have been satisfied when:

(1) If metallic casings are used, the casing is new standard steel, wrought iron, or cast iron as specified in the following tables or equal, and the pipe sections are threaded or welded so as to be watertight.

(*a*) In establishing the depth of casing or curbing below the ground surface, the measurement is made from the established grade in the immediate vicinity of the source. The casing or curbing shall extend as far as practicable below the natural ground level, but not less than 10 feet, and excessive depths of fill should be avoided.

(*b*) The annular space between the outside well casing and the well hole, for drilled wells, is filled with not less than 1½ inches of impervious cement grout to a depth of at least 10 feet and to such greater depth as may be required by the health officer. Refer to appendix A for discussion of cement grouting of drilled wells.

(*c*) Telescoping casings of different diameters, in a drilled well, overlap at least 8 feet and the annular space between such casings is filled with not less than 1½ inches of impervious cement grout or with a lead packer to prevent admission of undesirable ground water or surface drainage.

(*d*) The outside casing is not used as a suction or working barrel for pump plungers.

(2) The casing extends not less than 6 inches above the established ground surface at the well or the floor of the pump house.

(3) If concrete pipe, vitrified tile pipe, cement asbestos pipe, galvanized well casing, corrugated metal pipe, or brick are used for curbings for wells or springs, the following requirements are satisfied:

(*a*) Vitrified tile pipe, cement asbestos pipe, galvanized well casing, corrugated metal pipe, and concrete pipe shall be surrounded by not less than 6 inches of concrete to a depth of at least 10 feet. The surrounding concrete wall shall be not less than 6 inches thick, properly reinforced, and the concrete shall be so placed as to be free from voids. Wherever practical, the wall shall be poured in one operation, but in no case shall there be a construction joint within 10 feet of the top of the curbing. Where construction joints are essential at points more than 10 feet below the ground surface they shall be left rough and shall be washed and brushed with neat cement grout prior to pouring concrete.

TABLE 3.—*Steel and wrought-iron well casing*

Nominal size in inches	Well casing: Weight, pounds per foot (threads and couplings, inclusive)	Well casing: Thickness in inches	Well casing: Diameter in inches: Internal	Well casing: Diameter in inches: External	Well casing: Threads per inch	Couplings: Length in inches	Couplings: External diameter in inches
1	1.68	0.133	1.049	1.315	11½	1⅞	1.576
1¼	2.28	.140	1.380	1.660	11½	2⅛	1.950
1½	2.73	.145	1.610	1.900	11½	2⅜	2.218
2	3.68	.154	2.067	2.375	11½	2⅝	2.760
2½	5.82	.203	2.469	2.875	8	2⅞	3.276
3	7.62	.216	3.068	3.500	8	3⅛	3.948
3½	9.20	.226	3.548	4.000	8	3⅝	4.591
4	10.89	.237	4.026	4.500	8	3⅝	5.091
4½	12.64	.247	4.506	5.000	8	4⅛	5.591
5	14.81	.258	5.047	5.563	8	4⅛	6.296
6	19.18	.280	6.065	6.625	8	4⅛	7.358
8	25.00	.277	8.071	8.625	8	4⅝	9.420
10	35.00	.307	10.136	10.750	8	6⅛	11.721
12	45.00	.330	12.090	12.750	8	6⅛	13.958
14 OD	57.00	.375	13.250	14.000	8	7⅛	15.446
15 OD	61.15	.375	14.250	15.000	8	7⅛	16.446
16 OD	65.30	.375	15.250	16.000	8	7⅛	17.446
17 OD	73.20	.375	16.214	17.000	8	7⅛	18.683
18 OD	81.20	.375	17.182	18.000	8	7⅛	19.921
20 OD	90.00	.375	19.182	20.000	8	7⅝	21.706

Where pipe sections are connected by welded joints, threading and couplings are not essential.

TABLE 4.—*Threaded cast-iron well casing*

Well casing							Couplings	
Nominal diameter (inches)	Weight, pounds per foot	Wall, thickness in inches	Diameter in inches		Maximum length of string, in feet	Threads per inch	Length in inches	External diameter in inches
			Internal	External				
3	11.2	0 360	2.780	3.500	1,200	8	3¾	4.125
3	12.2	.360	3.155	3.875	1,200	8	3¾	4.750
3	12.7	.360	3.240	3.960	1,200	8	3¾	4.875
4	15.0	.370	3.760	4.500	1,200	8	4	5.250
4	17.0	.380	4.040	4.800	1,200	8	4	5.750
4	17.2	.380	4.240	5 000	1,200	8	4	6.000
5	18.5	.380	4.803	5.563	1,200	8	4¼	6.375
6	24.4	.400	5.825	6.625	1,200	8	4½	7.500
6	27.0	.430	6.040	6.900	1,200	8	4½	7.875
6	28.1	.430	6.240	7.100	1,200	8	4½	8.250
8	36.7	.460	7.705	8.625	1,400	8	5	9.625
8	42.0	.500	8.050	9 050	1,400	8	5	10.125
8	43.1	.500	8 300	9 300	1,400	8	5	10.625
10	52.1	.520	9.710	10 750	1,400	8	5¼	12.000
10	59.0	.570	9.960	11.100	1,500	8	5¼	12.500
10	60.5	.570	10 260	11.400	1,500	8	5¼	13.000
12	69.2	580	11.590	12 750	1,500	8	5¾	14.125
12	77.0	.620	11.960	13.200	1,500	8	5¾	14.625
12	78.3	.620	12 260	13 500	1,500	8	5¾	15.250
14	99.0	.690	13.920	15 300	1,500	8	6¼	16.875
14	102.0	.690	14 270	15 650	1,500	8	6¼	17.625
16	122 0	.750	1[illegible] 900	17 400	1,600	8	6¾	19.250
16	126.0	.750	16.300	17.800	1,600	8	6¾	20.000
18	152.0	.830	17.840	19.500	1,600	8	7	21.250
18	156.0	.830	18 260	19.920	1,600	8	7	22.375
20	179 0	.880	19.840	21 600	1,600	8	7½	23.625
20	183 0	880	20.300	22 060	1,600	8	7½	24.625
24	243.0	1 000	23.800	25 800	1,600	8	8¼	28.125
24	248 0	1 000	24.320	26 320	1,600	8	8¼	29.250

Where pipe sections are connected by welded joints, threading and couplings are not essential.

The concrete used in the construction of any ground water supply units should be composed of 1 part Portland cement, 2 parts sand, and 4 parts gravel by volume. Clean, hard, tough, and durable aggregates should be used. The maximum diameter of aggregate particles should not exceed one-fifth of the minimum width between forms. Hydrated lime to the extent of 10 percent of the volume of cement may be added to increase fluidity and facilitate placement of concrete. The use of lime is particularly applicable in the case of concrete used for spring and dug well casings.

(*b*) Single brick walls. Single brick walls shall be surrounded by not less than 6 inches of concrete as described in paragraph (*a*).

(*c*) Double layer brick walls have an inch thick layer of 1 to 1 Portland cement mortar applied either to the exterior of the brick wall or between the two rings of brick. Both the vertical and horizontal joints in the two rings of brick are staggered. The brick is common brick, compact in texture, hard burned entirely through, sound and uniform in quality and free from lumps and cracks.

(*d*) Well and spring basin curbings extend at least 6 inches above the established ground surface.

(*e*) The peripheral space between a dug well or a spring basin curbing and the original earth formation is filled with thoroughly compacted clean puddled clay or equivalent materials.

(*f*) A separate inside pipe for conducting water from a well, commonly known as a drop pipe, is provided.

ITEM 6. GRAVEL TREATED WELLS

When gravel is placed in the annular space between the excavation line and the outside of the well casing, the gravel surface shall terminate a safe distance below the ground surface and the annular space above the gravel surface shall be filled with impervious material. It is desirable to disinfect the gravel used with a chlorine solution because it is practically impossible to do so after the gravel has been placed.

Public health reason.—Proper filling of the annular space between the excavation line and the outside of the well casing with impervious material for a safe distance above the gravel surface is essential to prevent contaminated surface water from reaching the source of supply through the gravel layer. The use of contaminated gravel may result in unsatisfactory bacteriological tests over a long period of time and even if this gravel contamination has no sanitary significance it may mask the true quality of the ground water source.

Satisfactory compliance.—This item shall be deemed to have been satisfied when:

(1) The gravel surface terminates not less than 10 feet below the ground surface.

(2) The annular space between the excavation line and the outside of the well casing, above the gravel surface, is filled with thoroughly compacted puddled clay, mortar, or cement grout.

(3) Gravel used for treating wells is disinfected with a chlorine solution immediately before application to the well.

ITEM 7. COVERS, PLATFORMS, AND FLOORS

Every cover, pump platform, or pump room floor shall be watertight and elevated above the adjacent ground level and its surface sloped to facilitate the rapid removal of waste water.

Public health reason.—A properly elevated, watertight, well-drained cover or floor promotes cleanliness and is essential to divert contaminated surface water away from the source.

Satisfactory compliance.—This item shall be deemed to have been satisfied when:

(1) The cover, pump platform, or pump room floor is made of reinforced watertight concrete.

(2) The concrete is sloped from the center of the well casing or pipe sleeve to the outer edges of the slab or the drain, and the slab at its outer edges is not less than 4 inches thick.

(3) In the case of drilled or bored wells equipped with hand-operated pumps, the concrete slab extends not less than 2 feet from the well casing in all directions.

(4) In case power pumps are mounted over the casing, the casing extends not less than 6 inches above the pump platform or floor and not less than 1 inch into the pump base in accordance with the provisions of item 11 (B) of this manual.

(5) In the case of hand pumps, the casing or pipe sleeve extends not less than 1 inch above the pedestal on which the pump base rests.

(6) The cover of a dug well or spring basin is watertight, properly grouted in place, and its edges extend at least 2 inches beyond the outer edge of the wall or curbing of the well or spring basin

(7) In the case of drilled or bored wells, the cover, pump platform, or pump room floor rests on thoroughly compacted earth.

ITEM 8 WELL SEALS OR COVERS

Every well shall be provided with a watertight seal or overlapping cover at the top of the casing or pipe sleeve.

Public health reason.—A watertight seal or overlapping cover at the top of the casing or pipe sleeve is essential to prevent contaminated water or other deleterious material from entering the well through the annular opening at the top of the well casing or pipe sleeve.

Satisfactory compliance.—This item shall be deemed to have been satisfied when:

(1) In case the pump and drop pipe are not installed immediately after the casing or pipe sleeve is installed, the top of the casing or pipe sleeve is provided with a watertight seal or overlapping cover at the top until the installation is completed and a permanent seal is provided.

All wells should be kept permanently sealed, or properly covered, at the top at all times, except when necessary to remove the seal for the purpose of inspection or to accomplish necessary installations, repairs, or other essential operations.

(2) The casing or annular opening between the casing and drop pipe is provided with a watertight seal or overlapping cover, making a watertight connection to drop pipe, at the top. This item shall be satisfied when a properly constructed pump base overlaps the casing or pipe sleeve at the top.

ITEM 9. WELL VENTS

Well vents shall be constructed and installed to retain atmospheric pressure conditions in the well casing and to prevent the entrance of contamination.

Public health reason.—Proper construction and installation of a well vent is essential to prevent the entrance of insects and contaminating material into the well. Creation of a partial vacuum within the well might tend to introduce pollution or cause collapse of the well wall or casing.

Satisfactory compliance.—This item shall be deemed to have been satisfied when:

(1) Every well in which the draw-down is 10 feet or more, and which has equipment or appurtenances installed therein, is provided with an adequate air vent.

(2) The air vent is constructed of metal tubing or pipe and connected so as to be watertight.

(3) The open end of the vent is screened and terminated in a downward direction through use of an elbow or equivalent means and the lower end of the outlet is not less than 12 inches above the top of the well casing, and in no case less than 18 inches above the floor of the pump room.

The vent shall be screened with 16-mesh brass or bronze screen, or holes ¼ to ½ inch in diameter may be drilled in the capped, downward directed portion of the vent pipe and 16-mesh brass or bronze screen tightly fitted over these holes. The cross-sectional area of these holes should be at least equal to the cross-sectional area of the vent pipe.

ITEM 10. WELL PITS

Wellheads, well casings, pumps, pumping machinery, exposed suction pipes, or valve boxes connected with a suction pipe shall not be located in any pit, room, or space extending below the ground surface: *Provided,* That existing pits may be provisionally accepted only if constructed in accordance with the requirements of the State health department.

Public health reason.—Excavations or subsurface structures such as well pits provide means for the accumulation of contaminated surface or shallow subsurface water which may contaminate the water supply.

A number of sanitary pitless underground pumps are available on the market which eliminate the installation of underground discharge pumps in pits for frost protection. Standard parts can be purchased and assembled in such a way as to accomplish the same results. The need for frost pits may be avoided by the use of bleeders or weep holes located in the drop pipe at a point below the frost line in order that the water in the pump and drop pipe may run back into the well after pumping has been discontinued. The need of locating pump room floors below the ground level may be avoided by providing an insulated pump house to protect the pumping equipment and appurtenances from freezing. If additional protection is essential during unusually cold weather, it can be provided at a nominal cost by installing a thermostatically-controlled electric heater or other types of heating units in the pump house.

Satisfactory compliance.—This item shall be deemed to have been satisfied when:

(1) In the case of new installations, wellheads, well casings, pumps,

pumping machinery, valve boxes connected with a suction pipe, or exposed suction pipes are not located in any pit, room, or space extending below ground level: *Provided*, That submersible pumps constructed to operate below the water level within the well casing may be installed on approval of the health officer.

(2) In the case of existing ground water supplies, such pits housing wellheads, well casings, pumps, pumping machinery, suction pipes, or valves connected with a suction pipe shall be accepted provisionally only if constructed or reconstructed in accordance with requirements of the State health department. It is recommended that provisionally accepted pits conform with the following minimum requirements as well as with any requirements set up by the State health department for their approval of specific installations:

(*a*) Pits shall be of watertight construction with walls extending at least 6 inches above the established ground surface at all points.

(*b*) Pits shall be provided with a watertight concrete floor sloping to a drain which discharges through a cast-iron line not less than 4 inches in diameter to the ground surface at a lower elevation than the pit, and at least 30 feet from it; or if this is impossible, to a watertight concrete sump, in the pit, equipped with an automatic sump pump discharging through a steel or cast-iron line to the ground surface at least 30 feet from the pit. (See item 12(B).)

(*c*) Pits shall be provided with a concrete base for pumps, or pumping machinery, so that such units shall set at least 12 inches above the floor of the pit.

(*d*) Pits shall be provided with a satisfactory housing or cover in all cases.

ITEM 11. CONSTRUCTION AND INSTALLATION OF PUMPS

All water pumps shall be so constructed and installed as to prevent contamination of the water supply.

Public health reason.—Proper construction and installation of pumps is essential to prevent contamination from entering the well by means of the pump or pump mounting.

ITEM 11 (A). HAND PUMPS

Hand pumps may be mounted by setting the pump over the pipe sleeve and anchoring the base of the pump to the concrete pedestal or by mounting the base of the pump on a metal flange which is anchored rigidly to the pipe sleeve. The latter method of mounting a hand pump is preferable, inasmuch as this method provides a more permanent and rigid connection which is easily accessible when repairs are made. Hand pumps which are anchored to the concrete pedestal by means of nuts and bolts become loosened, resulting in an unsatisfactory

installation. Where a hand pump is mounted on a flange, the pipe sleeve should extend at least 6 inches above the top of the concrete platform.

Satisfactory compliance.—This item shall be deemed to have been satisfied when:

(1) Hand pumps are of the force type with cylinders placed below or near the water level so that priming is not necessary.

(2) The pump base is watertight and of the solid one-piece recessed type, cast integrally with or threaded to the pump column or stand.

(3) The pump base is of sufficient diameter and depth to permit the well casing to extend not less than 1 inch into the base of the pump.

(4) The pump base is rigidly fastened to a metal flange by means of bolts and nuts, or by equivalent means.

(5) The pump head is of the closed type provided with a pump rod stuffing box.

(6) The pump spout is of the closed downward directed type.

(7) Suitable gaskets are used between the pump base and the flange to insure a watertight joint.

ITEM 11 (B). POWER PUMPS

Satisfactory compliance.—This item shall be deemed to have been satisfied when:

(1) Any pump or power unit placed immediately over the well casing or pipe sleeve has a watertight metal base to form a cover for the well. The base plate is recessed on the underside to permit the casing or pipe sleeve to extend into it at least 1 inch above the level of the concrete foundation upon which the base of the pump or power unit rests, thus forming an overlapping cover with edges projecting below the top of the casing or pipe sleeve.

Where necessary the casing head can be enlarged or decreased in diameter by means of a pipe sleeve extension securely attached to the casing so as to be watertight. On flat base plates and other shapes where radial ribs interfere, a skirt projecting downward at least 1 inch below the top of the well casing may be welded to the outside edge of the base plate to form the overlapping cover for the well casing.

In installations having an open type pedestal for pump or power unit and having ample space to permit installation and removal of a watertight metal cover or of a lead packing or of a seal of sand and asphalt compound or cement grout, this type of closure may be used in lieu of the base plate type of cover, specified above, for the annular space between the suction pipe and the well casing. The well casing must extend at least 6 inches above the established ground surface at the well or the floor of the pump house, as required in paragraph (2) of item 5 of this manual.

(2) In the case of power pumps which are not placed directly over the well, the well casing extends at least 6 inches above the established ground surface at the well or the floor of the pump house and the annular space between the well casing and suction pipe is closed with a watertight cover or lead seal to prevent the entrance of contamination into the well.

(3) In case a submersible pump is installed within the well casing below the water level, the motor is enclosed completely in a watertight metal casing constructed to prevent oil from coming in contact with the water, and the oil is conveyed to the motor housing through noncorrodible heavy metal tubing.

(4) Any opening in the base plate of the pump or annular opening made by passing a pipe through the pump base is made watertight to a point above the spill line of the webbing around the plate. Such an opening may be threaded and a nipple extending above the spill line of the webbing screwed into it. The annular opening between the nipple and pipe passing through it may be leaded, fitted with a stuffing box and packing, or provided with an overlapping cover welded to the pipe. If there are any other openings in the base plate they are threaded and fitted with metal screw plugs.

(5) The pump or power unit base is anchored rigidly to the well casing or the pump platform.

(6) The discharge tee, check valve, and gate valve are located above the pump room floor.

(7) The discharge line from a power pump is provided with a sampling cock with the outlet terminating in a downward direction.

ITEM 12. PUMP HOUSE

The pump house shall be constructed properly to prevent flooding, shall be provided with adequate floor drainage, and if plumbing fixtures are to be provided they should be designed and installed properly.

ITEM 12 (A). CONSTRUCTION TO PREVENT FLOODING

Public health reason.—Proper construction of the pump house is essential to eliminate the possibility of the interior of the structure being flooded during emergencies.

Satisfactory compliance.—This item shall be deemed to have been satisfied when:

(1) The pump house is provided with a doorway and a door at least 6 square feet in area which opens outward and extends to the floor.

(2) Pump houses located on side hill slopes have not less than 50 percent of the floor area above ground level and the door located on that part of the floor above ground level.

ITEM 12 (B). DRAINAGE OF FLOORS

Public health reason.—A well-drained concrete floor promotes cleanliness and facilitates the removal of waste water.

Satisfactory compliance.—This item shall be deemed to have been satisfied when:

(1) A floor drain is provided and is constructed of cast iron or equivalent material with an outlet not less than 4 inches in diameter.

(2) The inlet to the floor drain is located not less than 2 feet from the outer edge of the casing or pipe sleeve.

(3) A cast-iron pipe line with watertight leaded joints is connected to the floor drain and carried to a point not less than 4 feet outside the building walls and connected to other suitable pipe which discharges onto the ground surface not less than 30 feet from the source: *Provided,* That where the drain line cannot be extended to the ground surface on a uniform grade toward the outlet, the line may discharge into an absorption pit located not less than 30 feet from the source. The drain line should be laid at a grade toward the outlet of not less than ⅛ inch per foot, except that for a floor drain installed for the purpose indicated and in the manner specified in this item (12 B), the requirements of item 3, "Distances to Sources of Contamination," shall not apply thereto. However, such drains shall not be connected to a storm or sanitary sewer, they may discharge to the ground surface or to a dry well which is well removed from contact with sewage or other wastes.

ITEM 12 (C). PLUMBING FIXTURES IN PUMP HOUSE

Public health reason.—Properly designed and installed plumbing fixtures will eliminate the public health hazard caused by the back siphonage of contaminated liquid wastes from faulty plumbing fixtures into the water supply piping.

Satisfactory compliance.—This item shall be deemed to have been satisfied when:

(1) Toilets, sewers, soil pipes, or drains are not located on the first floor directly above the pump room floor, or where leakage therefrom can reach any source of water supply or pump room.

(2) The locations of toilets, sewers, soil pipes, or drains in the pump house are approved by the health officer, and the installation conforms to the requirements of item 3 of this manual, "Distances to Sources of Contamination."

(3) All plumbing fixtures comply with the Federal Specifications for Plumbing Fixtures, March 1940, WW–P–541a, or its equivalent. The requirements of these specifications with respect to air gaps and backflow preventers are strictly enforced.

ITEM 13. LUBRICATION OF PUMP BEARINGS

Pump bearings situated in any well below the pump room floor or platform shall be lubricated with water of a safe sanitary quality.

Public health reason.—Lubrication of pump bearings, situated in a well below the pump room floor, with oil, grease, or water other than of a safe sanitary quality may result in contamination of the water supply.

Satisfactory compliance.—This item shall be deemed to have been satisfied when:

(1) Pump bearings situated in any well below the pump room floor or platform are lubricated with water taken from within the well, or reservoir, or distribution system supplied with water from the original source of water supply, or from another supply which meets with the requirements of the health officer.

(2) In the case of existing installations using oil-lubricated bearings, the oil is stored and handled so as not to expose it to contamination.

ITEM 14. PRIMING OF POWER PUMPS

Priming type power pumps shall be primed with water of a safe sanitary quality applied from properly protected equipment.

Public health reason.—Priming of power pumps with water other than of a safe sanitary quality may result in contamination of the water supply as the result of priming water being forced into the distribution system.

Satisfactory compliance.—This item shall be deemed to have been satisfied when:

(1) Power pumps are primed with water taken from the original source for which the pump is used or from a reservoir or distribution system supplied with water from the original source of water supply or from another supply which meets the requirements of the health officer.

(2) Priming devices are so constructed and installed as not to expose the water to dust, drippings, or other sources of contamination.

ITEM 15. PROTECTION OF SUCTION PIPES

All subsurface suction piping leading from detached wells or reservoirs shall be protected adequately against the entrance of contamination.

Public health reason.—The suction created in the pipe line when water is pumped may result in contaminated ground water or surface water being drawn into the line through breaks or defective joints in the suction line.

Satisfactory compliance.—This item shall be deemed to have been satisfied when:

(1) The pumps are placed directly over the well, sump, or reservoir wherever practicable, and the suction pipe, where located above ground, is in a frostproof box.

(2) In the case of a suction pipe rising to a pump house the outer casing extends not less than 6 inches above the platform or floor surface.

(3) The annular space between the protective casing pipe and the suction pipe is provided with a watertight seal at the top.

(4) Subsurface suction piping is not less than 10 feet below the ground, either natural or fill.

(5) All that part of any suction piping within 10 feet of and below the ground surface is surrounded by a watertight outer casing pipe or protected by equivalent means. In case of filled ground, an outer protective casing shall be used, regardless of depth of suction pipe.

Frequently the discharge lines of well pipes are under negative pressure. This is caused by water running back down into the well when the pump stops. These sections of pipe should be protected against contamination by methods similar to those recommended for suction pipes.

ITEM 16. VALVE BOXES

Every valve box on a buried suction pipe line shall be constructed and installed properly.

Public health reason.—Proper construction and installation of valve boxes are essential to prevent contaminated surface water from entering the valve box and accumulating around the valve. Valves submerged by surface water may result in contamination being drawn into the suction line through defective valves and connections.

Satisfactory compliance.—This item shall be deemed to have been satisfied when:

(1) Valves located on buried suction lines are protected with valve boxes which project not less than 6 inches above the floor if in a building or room, and not less than 12 inches above the ground surface if not enclosed in a building.

(2) The tops of all such valve boxes are provided with watertight overlapping covers.

(3) In case valves are installed on buried suction lines located 10 feet or more below the ground surface, the valve box is watertight for not less than 10 feet below the ground surface, and when the space between the valve box and the natural ground formation is filled with compacted puddled clay or equivalent materials.

(4) In case valves are installed on buried suction lines located less than 10 feet below the ground surface, the valve is enclosed completely in a watertight valve box. When valves cannot be enclosed completely in a valve box, the box shall be watertight and the opening between the base of the valve box and the valve dome or cover shall be sealed so as to be watertight.

Valves on buried suction lines should be avoided wherever possible by placing suction pipes above the pump room floor or above the ground surface.

ITEM 17. MANHOLES AND COVERS

Every manhole opening on spring structures, dug wells, or valve chambers shall be curbed above the adjoining surface and provided with an overlapping watertight cover.

Public health reason.—Manhole openings that are curbed and provided with an overlapping watertight cover are essential to prevent contaminated surface water from entering the manhole opening.

Satisfactory compliance.—This item shall be deemed to have been satisfied when:

(1) The manhole opening is curbed to a height of at least 6 inches above the adjoining surfaces.

(2) The manhole cover is watertight and overlaps the curbing and extends downward around it for not less than 2 inches.

(3) The manhole cover is kept in place by means of a hasp and lock, or by equivalent means.

(4) In case metal manhole covers are provided, the covers are welded, formed, or molded to form the overlap for the manhole opening and the metal shall be at least 12 gage.

ITEM 18. AIRLIFT SYSTEMS

The air compressor and appurtenances for any airlift system or mechanical aerating apparatus used in connection with a ground water supply shall be installed and operated properly.

Public health reason.— Proper construction, installation, and protection of air compressors and appurtenances is essential to prevent the entrance of insects, birds, or other contaminating materials, and to minimize the entrance of dust.

Satisfactory compliance.—This item shall be deemed to have been satisfied when:

(1) Watertight metal tubing, pipe, or equivalent materials are used for air intakes.

(2) The open end of an air intake of any airlift system or mechanical aerating apparatus is not less than 6 feet above the floor surface if indoors, 10 feet above the ground surface if outdoors, and 2 feet above a roof of a building through which it may project.

(3) The open end of the air intake is screened with 16-mesh brass or bronze screen, terminated in a downward direction, and an air filter installed in the intake line.

(4) The air compressor is located in a room as free as possible from dust and at such elevation that flooding of the equipment will be made impossible.

(5) The compressed air from the compressor is discharged into an air storage tank, oil trap, or filter designed to remove from the compressed air oil or oil mist which may have entered during its passage through the compressor.

ITEM 19. CROSS-CONNECTIONS

There shall be no physical connection between a safe public ground water supply and any other water supply not of equal sanitary quality and under as rigid official supervision, and there shall be no connection or arrangement by which unsafe water may enter a safe public ground water supply system.

Public health reason.—This item is important, inasmuch as cross-connections have been found to be one of the principal causes of water-borne disease outbreaks. Wolman's and Gorman's figures show that during a 7-year period (1930–36) 14 reported water-borne outbreaks resulting in 139 cases of typhoid fever and 563 cases of diarrhea were due to cross-connections between safe and polluted water supply systems.

Satisfactory compliance.—This item shall be deemed to have been satisfied when:

There are no cross-connections, backflow connections, emergency intakes, bypasses,[1] or other arrangements by means of which polluted water or water of unknown or questionable quality may enter a safe public ground water supply system: *Provided*, That water of a safe sanitary quality may be supplied to any other system containing water of questionable quality only by means of an independent line discharging at least two pipe diameters and not less than 6 inches above the rim of storage units open to atmospheric pressure.

ITEM 20. BACTERIOLOGICAL, PHYSICAL, AND CHEMICAL QUALITY OF WATER

The bacteriological, physical, and chemical quality of water furnished to consumers from a public ground water supply shall be not less than the requirements of the Public Health Service[2] for drinking and culinary water used on common carriers operating in interstate commerce; when necessary, the water shall be treated to conform with the Public Health Service requirements.

Public health reason.—Diseases such as typhoid fever, cholera, dysentery, and other enteric diseases may be transmitted through the use of contaminated drinking water, and physiological disturbances may occur from the use of chemically or physically unsatisfactory water.

---

[1] These terms are defined in section 1 of this manual.

[2] Reprint No. 2440, Public Health Reports. Available from Superintendent of Documents for 10 cents.

Satisfactory compliance.—This item shall be deemed to have been satisfied when:

(1) Untreated waters meet in all respects the requirements of this manual. Only those supplies meeting the bacteriological, physical, and chemical requirements of the United States Public Health Service Drinking Water Standards as shown by satisfactorily regular and frequent sanitary inspections and laboratory tests shall be approved for use without treatment.

(2) Public ground water supplies subject to a low degree of contamination (average coliform content of not more than 50 per 100 ml. in any month), but otherwise meeting all requirements of this manual, are given treatment consisting of chlorination and storage.

Chlorination facilities including equipment, control, and operating procedures shall be approved by the health officer. Free chlorine should be in contact with the treated water for not less than 20 minutes, or chloramine preferably for at least 3 hours before the treated water reaches the first consumer. Where necessary, baffle walls shall be used to prevent short-circuiting of the water from the inlet to the outlet of the detention reservoir so that the water will remain in the reservoir for the full flow-through period of time. The treated effluent shall meet the bacteriological requirements of the Public Health Service Drinking Water Standards.

Treatment shall be employed when there is a possibility of contamination reaching the water supply source and rendering it unsafe for domestic use. Treatment, however, should not be used permanently to overcome a defect of construction which can and should be corrected.

Where a treated underground supply is in use and an equally good untreated supply can be obtained, the treated supply shall be considered as temporary, to be used only until the untreated supply can be made available. Treatment may then be used as an additional safeguard.

On a site where the earth formations permit the rapid movement of ground water, such as coarse gravel, fissured rock, solution channels, and similar formations, the ground water cannot be considered safe, and adequate treatment shall be provided.

(3) Treatment consisting of sedimentation, filtration, and disinfection is provided for waters containing numbers of coliform bacteria averaging over 50 per 100 ml. but not more than 5,000 per 100 ml. in any month and exceeding 5,000 per 100 ml. in not more than 20 percent of the samples examined in any month.

Treatment processes, operation, and control for this class of water shall be approved by the State department of health. The treated

effluent shall meet the bacteriological requirements of the Public Health Service Drinking Water Standards.

(4) Ground water supplies subjected to softening treatment or treatment for mineral removal employing various processes using chemicals in contact with the water, aeration, filtration, and similar methods are chlorinated before delivery for consumption.

ITEM 21. PLANT SUPERVISION AND CONTROL

All public ground water supplies shall be under the supervision and control of a competent operator.

Public health reason.—A competent operator is essential to prevent contamination of the water supply during reconstruction work, repair to equipment and appurtenances, or in the operation of the plant.

Satisfactory compliance.—This item shall be deemed to have been satisfied when:

(1) All plants are under the supervision of a competent operator approved by the health officer, and in those States which have licensing requirements for waterworks operators, such requirements are met by the operator.

(2) In case of untreated ground water supplies, the operator is available on call in any emergency.

(3) In case the treatment of the water consists of chlorination and storage only, the operator visits the plant not less than twice each day and is available on call in any emergency.

(4) In case additional treatment of the water supplements chlorination and storage, the supervision of the plant meets the requirements of the health officer.

(5) In case of treated ground water supplies, the operator keeps records essential to the control and operation of the plant and submits copies of such records as the health officer may require.

ITEM 22. WATER SAMPLING

Chemical analyses and bacteriological examinations of water samples and tests for residual chlorine shall be made by approved methods and at proper intervals.

Public health reason.—Chemical analyses and bacteriological examination of water samples and tests for residual chlorine are essential to guide the operator in running the plant and to determine whether the water is of satisfactory sanitary quality.

The recommended minimum intervals at which samples should be collected from all ground water supplies for bacteriological examina-

tion and residual chlorine tests are presented in the following tabulation:

Type of treatment	Minimum interval of sampling for— Bacteriological examination [1]	Residual chlorine tests
None	1 month	
Chlorination and storage only	1 week	At least once in each successive 8-hour period.
Aeration, sedimentation, and filtration, or any combination thereof with chlorination and storage	Daily	Do.

[1] The number of bacteriological samples to be collected from the distribution system per month should be in accordance with the requirements of the Public Health Service Drinking Water Standards as indicated in figure 1

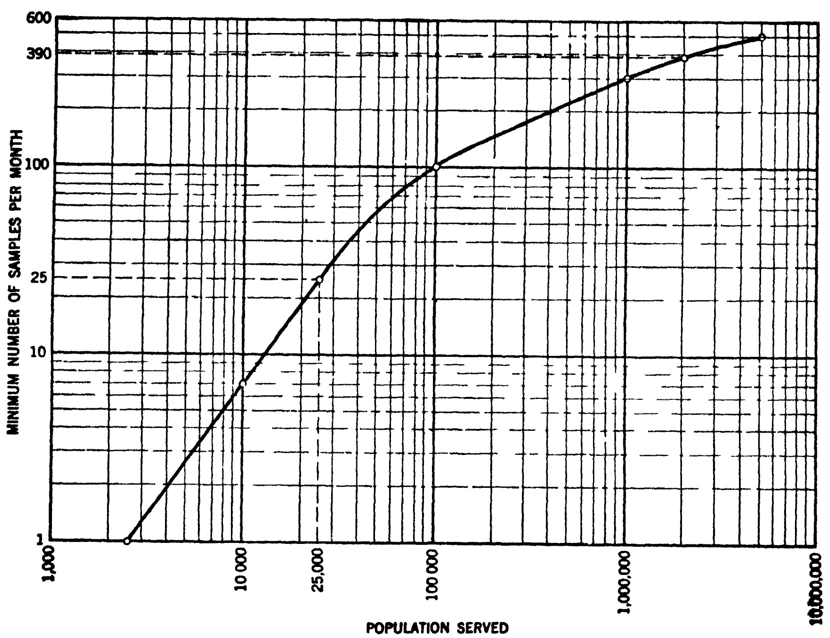


FIGURE 1

In addition to bacteriological examinations and residual chlorine tests for underground water supplies requiring aeration, sedimentation, and filtration, or any combination thereof with chlorination and storage, the following laboratory tests should be made at frequent intervals where they are essential to control the treatment plant operation: temperature of air and water, turbidity, color, alkalinity, hydrogen-ion concentration (pH), and hardness. Occasionally special tests may be necessary such as for residual alum, iron, manganese, or other undesirable constituents of the final effluent. Where prechlorination is used in addition to postchlorination, tests for residual chlorine should be made at each major stage of treatment, and, in the raw water, test for chlorine demand.

For operational control at the plant, the frequency of tests, particularly for turbidity, residual chlorine, bacterial count, and coliform organisms, though dependent on the character of water treated and on its variability, should be such that at least one test each 24 hours and every day of the week will be carried out. For the larger plants, at least three sets of samples are usually collected daily for bacteriological tests. Determinations of turbidity and residual chlorine are made more frequently, sometimes at hourly intervals when the character of the raw or partly treated water is changing rapidly.

Satisfactory compliance.—This item shall be deemed to have been satisfied when:

(1) All physical, chemical, bacteriological, and biological tests are made in conformity with "Standard Methods for the Examination of Water and Sewage," American Public Health Association, 8th Edition, 1936.

(2) Bacteriological and chemical tests of water samples from a newly developed or constructed ground water supply are made at least once following disinfection. The supply shall not be used for domestic purposes, where adequate treatment has not been provided, until the report on the bacteriological examination of water samples indicates that the water is of a safe sanitary quality.

(3) All ground water supplies are sampled for bacteriological, chemical, and physical tests at such intervals as the health officer may require.

ITEM 23. ABANDONMENT OF WELLS

Permanently abandoned wells shall be adequately filled with selected material to protect the water-bearing formation against possible contamination.

Public health reason.—Adequate filling of a permanently abandoned well is essential to prevent contamination from being introduced into the water-bearing formation through an abandoned well, which may result in contamination of existing or future ground water supplies in the vicinity.

Satisfactory compliance.—This item shall be deemed to have been satisfied when:

(1) Drilled or cased wells are filled completely with neat cement grout, concrete, or clean puddled clay.

(2) Driven wells are filled completely with neat cement grout, concrete, or clean puddled clay.

(3) Dug or bored wells are filled completely with puddled clay or its equal after as much as possible of the curbing is removed.

ITEM 24. DISTRIBUTION

The distribution system shall be designed and constructed so as to prevent leakage of water due to defective materials, improper jointing,

corrosion, settling, impacts, freezing, or other causes. Adequate valves and blow-offs, properly installed, shall be provided so that necessary repairs can be made with a minimum interruption of service.

Public health reason.—Proper design and construction of the distribution system are necessary in order to deliver a safe water, to guard against contamination of water in the mains from outside sources, and to prevent leakage under conditions of decrease in pressure or negative pressure, and during repairs, break-downs, and installation of new mains.

Satisfactory compliance.—This item shall be deemed to have been satisfied when:

(1) Cast-iron water mains are laid in accordance with the "Specifications for Laying Cast-Iron Pipe," adopted by the American Water Works Association (see Journal of the American Water Works Association, vol. 30, No. 2, February 1938).

(2) Trenching operations are conducted so that the contents of sewers and drains do not enter the trench.

Measures should be taken to prevent defecation and urination in the trench. Suitable sanitary conveniences should be provided for the workmen, and wherever practicable such sanitary facilities should be connected to the sewers. Proper trench drainage should be provided and the end of the pipe should be kept closed except when joints are being made.

(3) Newly laid pipe lines, before covering, are tested under a hydrostatic pressure 50 percent in excess of the normal operating pressure after expelling all air from the pipe. The duration of each pressure test shall be at least 30 minutes.

All exposed pipes, fittings, valves, hydrants, and joints should be carefully examined during the open trench test. All joints made with lead showing visible leakage should be recaulked until tight. Where the joints are made with sulfur compound or with cement and show seepage or slight leakage only such joints as may be defective should be cut out and replaced. Any cracked or defective pipes, fittings, valves, or hydrants discovered in consequence of this pressure test should be removed and replaced with sound material, and the test should be repeated until the pipe installation is satisfactory.

Suitable means should be provided for determining the quantity of water lost by leakage under normal operating pressure. No pipe installation should be accepted until or unless this leakage (evaluated on a pressure basis of 150 pounds per square inch) is less than 100 gallons per 24 hours per mile of pipe per inch nominal diameter for pipe in 12-foot lengths, 75 gallons for 16-foot lengths, and correspondingly varied for other lengths of pipe. In calculating leakage, allowance should be made for added joints in the pipe line above those incidental to normal unit lengths of pipe.

(4) Jointing materials are free from oil, tar, or greasy substances, are disinfected before use, examined bacteriologically after disinfection for freedom from coliform organisms, kept free from contamination, and applied dry; and when jointing materials will produce watertight joints, under all conditions to which the joint will be subjected.

(5) Water pipes are not laid in water, or where they can be flooded with water or sewage in laying, wherever this is practicable. When necessary to lay water lines below the water table or in wet ground, additional protection shall be provided for the joints, to insure watertightness, to the satisfaction of the health officer.

(6) Water mains crossing or laid near railroad tracks are constructed so that the pipe joints have a reasonable degree of flexibility and remain watertight.

The pipe line should be of such strength and tightness as to remain watertight under the loading and vibrations to which it will be subjected. Mechanical joints with rubber gaskets are suitable for such conditions. It is advisable in such situations to consult the railroad company and obtain approval for the crossing in advance of construction work.

(7) Laying of water pipes under water or under the bed of a stream is avoided and the crossing made on bridges, dams, or other structures sufficiently elevated so that the pipe will not be subject to immersion at any time, whenever this construction can be provided.

Above water crossings:

In cases where it is practicable to secure a satisfactory overhead crossing, particularly on bridges, consideration shall be given to the following items:

(*a*) The use of flexible pipe joints to maintain tightness under forces due to vibration and temperature variations and to prevent breaks and leaks at the points where the mains make sharp bends in leaving and returning to the ground.

(*b*) Protection of pipe from impact of runaway vehicles.

(*c*) Protection of pipe from flood waters or objects carried by flood waters.

Under water crossings:

In special cases where it is impossible or impractical to secure a satisfactory overhead crossing special construction to provide additional safeguards is necessary. These safeguards are briefly as follows:

(*a*) The pipe should not be laid on the stream bed or in the body of water. If an under crossing is made, it should be placed sufficiently far below the bottom of the body of water to protect the pipe against freezing and being moved by currents, ice, floating objects, anchors, dredges, or being otherwise disturbed. The distance below the stream bed should not be less than 5 feet.

(*b*) The pipe should be of special construction having flexible watertight joints.

(*c*) All pipe lines in under-water crossings should be provided with valves at both ends of the crossing so that the section can be isolated. The valves should be so located that they will not be subject to flooding.

(*d*) Permanent equipment should be installed for making periodic or continuous pressure tests for detecting leakage of the crossing.

(*e*) Sampling taps should be installed at each end of the crossing for the collection of samples for bacteriological examination.

(*f*) Provision should be made to blow off such sections of pipe to waste above ground level.

(*g*) Consideration should be given to the construction of under-water crossings in duplicate in order that continuous service and adequate pressure may better be maintained. Properly drained pipe tunnels deserve consideration because they facilitate inspection, repairs, and detection of leaks.

(8) Water lines are laid in trenches separated by at least 10 feet of solid earth from sewer lines.

(9) Water pipes are laid, so far as possible, above the elevation of nearby sewers and at least 10 feet laterally from them. Where this requirement cannot be met because of physical conditions, extra precautions are taken in securing absolute and permanent tightness of water pipe joints.

(10) Newly installed water mains are flushed thoroughly to waste through hydrants or other approved means to remove all dirt and foreign matter. The mains are disinfected in accordance with the following procedure and bacteriological tests indicate that the water conforms with the bacteriological requirements of the United States Public Health Service Drinking Water Standards before water conveyed in the mains is used for domestic consumption.

Disinfection procedure:

After flushing the mains, introduce chlorine and water so that the mixture of water and chlorine entering the pipe shall contain a chlorine concentration of at least 50 p. p. m. Retain treated water in the pipes long enough to destroy all nonsporeforming bacteria. The period of detention should be at least 3 hours and preferably longer. After the chlorine-treated water has been retained for the required time the chlorine residual at pipe extremities and at other representative points should be at least 5 p. p. m. If the residual is less than 5 p. p. m., the procedure should be repeated until a 5 p. p. m. residual is obtained. Upon completion of the disinfection process the water containing residual chlorine should be flushed from the system of pipes under treatment and water samples collected for the bacteriological examination mentioned above.

(11) All new plumbing is installed in accordance with the provisions of the State plumbing code and all existing plumbing which is not properly designed or properly installed, or both, is changed to conform with the State plumbing code as soon as the opportunity to do so presents itself.

Where State plumbing codes are not in effect the provisions of the "Plumbing Manual," Report BMS 66, issued by the National Bureau of Standards, should be followed. During the war emergency use of substitute materials for critical items required in BMS 66 will be permitted in accordance with requirements of the War Production Board.

(12) The water service pipe is watertight and corrosion-resistant. Copper pipe and cast-iron pipe with specially protected joints such as cast-iron pipe with bell joint clamps are recommended.

Where a water service pipe crosses a street sewer at less than 6 feet vertically above the sewer, or is within 10 feet of it horizontally, all that part of the water pipe lying within these distances should be constructed preferably of copper or brass pipe connected to the iron pipe with a brass fitting. In such cases it is preferable to use copper or brass pipe from the water main to the house, and the house sewers should be constructed of extra heavy cast iron with watertight joints. (During the war emergency where priorities necessitate the use of materials other than brass or copper, extra heavy iron pipe should be used under these conditions.)

(13) The handling, repairing, testing, and installation of water meters are carried out in such a manner as to prevent introduction of contamination into the water supply system.

Before meters are installed they should be disinfected unless they are disinfected together with adjacent pipe before the system is placed in service. If meters are disinfected some considerable time before they are placed in the pipe line, the inlets and outlets should be capped to prevent the entrance of dirt, dust, or other contaminating material. Meters may be disinfected by passing a solution of chlorine of about 50 p. p. m. strength into the meter and keeping it in contact with the parts for at least 5 minutes.

(14) Hydrant drains are not connected to sanitary or storm sewers but are connected to dry wells or drain to the surface of the ground. Wherever practical, the hydrant drain should be plugged and arrangements made to pump out the hydrants after use.

(15) Chambers or pits containing gate valves, air relief valves, blowoffs, or other such appurtenances to a distribution system are not connected directly to any sanitary or storm sewer, and blow-offs are not connected directly to any sewer.

(16) Booster stations on the distribution system are located in rooms that have floors above ground level and are so designed and located that they will not cause a negative head in the distribution piping.

In some cases it may be necessary to provide a receiving reservoir from which the water can be drawn instead of drawing suction directly from the mains.

(17) In case it is necessary to supply water from the mains of a water system that is known to be safe to some other system which is unsafe, the water is delivered through a pipe to a tank or reservoir connected to the unsafe system in accordance with the provisions of item 19 of this manual.

(18) The piping system is designed and installed to maintain a positive pressure in all its parts under normal usage at all times.

(19) The system is designed so as to afford effective circulation of water with a minimum of dead ends.

ITEM 25. STORAGE

All reservoirs and storage tanks shall be of sanitary and watertight construction and made of concrete, steel, wood, or other materials approved by the health officer: *Provided,* That wood shall not be used for reservoirs or storage tanks located wholly or partly underground. Reservoirs and storage tanks shall be located at safe distances from sources of contamination.

Public health reason.—Water which is safe and of approved quality at the source may be contaminated in storage units unless precautions are taken to prevent entry of shallow ground water, surface flood waters, or other pollution.

Satisfactory compliance.—This item shall be deemed to have been satisfied when:

(1) Ground water storage units are watertight. When such units are made of concrete they shall be adequately reinforced to prevent development of cracks; where construction joints are necessary, adequate water stops, approved by the health officer, shall be installed. If such units are made of steel they shall be protected against corrosion. Painting [3] of steel tanks usually affords protection from corrosion for a number of years. Cathodic protection is another method used for corrosion protection of metal tanks.

(2) All such water storage units are located at satisfactory distances from sources of contamination. In ascertaining such safe distances the requirements of item 3 of this manual shall be followed.

(3) All such water storage units are equipped with watertight covers, and manhole openings in such covers comply with the requirements of item 17 of this manual.

(4) All such ground water storage units are located and protected so that there is no danger of contamination by surface drainage or flooding.

---

[3] Tentative Standard Specifications for Elevated Steel Water Tanks, Standpipes and Reservoirs. J. Am. Water Works Assoc., 32: 39–42, (December 1940).

(5) Air vents in storage units are constructed of metal tubing or pipe connected so as to be watertight, and the open end of the vent is screened with 16-mesh brass or bronze screen and terminated in a downward direction by means of an elbow or equivalent means and the lower end of the outlet is not less than 12 inches above the roof of the storage unit, nor less than 24 inches above the established ground elevation.

(6) Overflows and water-level control gages are constructed so as to prevent the entrance of birds, insects, or contaminating materials, and when all openings are screened with 16-mesh brass or bronze screen and hooded or otherwise protected to prevent contaminating material from entering the opening.

(7) Overflows, blow-offs, or clean-out pipes, and drains from the roof or bottom of storage units are not directly connected to sewers.

Such pipes may discharge onto ground surface or into an open receptacle from a point at least 6 inches above the rim of the receptacle. The receptacle should be situated at ground surface and at least 50 feet from the reservior and may be connected to sewers.

(8) Storage units are located so that traffic will not pass over them.

(9) New reservoirs or tanks or such units which may have been contaminated or subjected to the possibility of contamination as during cleaning, alteration, painting, or repairing operations are disinfected before water from them is used for domestic consumption. The following procedure, recommended by the Minnesota Department of Health, is suggested as a satisfactory method of disinfection:

The underside of the roof should be washed down even though it is not normally in contact with the water. Since only the floor and walls are in contact with the water these parts should be given special attention. A given amount of chlorine is more effective if applied in concentrated solution to the walls and floor of the reservoir or tank with a brush or spray than if placed in a tank full of water.

Scattering dry powdered chlorinated lime onto the walls and the floor of the reservoir when it is empty and then filling it with water to the overflow is also fairly effective. Where a chlorine solution of high concentration (100 p. p. m.) is used on the walls and floor, it should be rinsed off by washing down the walls and the floor with a stream of water, and this water wasted. Any adjacent valves on pipe lines connected to the reservoir should be operated so as to bring the chlorine solution to all parts that come in contact with water in the pipe. When this has been done sufficient chlorinated lime should be placed in the reservoir to produce a residual of at least 1.0 p. p. m. at the end of a 3-hour holding period. The reservoir should then be filled with water to the overflow. After the treated water is held in the reservoir for at least 3 hours it may be turned into the distribution system. One part per million for 100,000 gallons of water will require 1.25 pounds of chlorinated lime of 66 percent available chlorine.

Reservoirs should always be disinfected after they have been altered, painted, or repaired. When the contamination is known to be limited, the disinfection may be accomplished by adding the chlorine to the reservoir full of water. The water may then be used in the distribution system.

Reservoirs may be utilized in providing large volumes of chlorinated water

for the purpose of disinfecting the pipe lines of the distribution system or parts of it.

For disinfecting purposes pressure tanks should be provided with an air-relief valve and an overflow on the top so that all air can be expelled from the tank and the entire surface of the interior brought into contact with water containing a high residual of chlorine.

ITEM 26. PROTECTION DURING CONSTRUCTION

All public ground water supply systems which are hereafter constructed, reconstructed, or extensively altered shall be adequately protected to prevent contamination of water at the source or in the system during construction.

Public health reason.- The diversion of surface water away from the source and the use of water of a safe sanitary quality during construction is essential to prevent contamination of the ground water supply.

Satisfactory compliance.—This item shall be deemed to have been satisfied when:

(1) All surface water is properly diverted away from the source during construction.

(2) All water used for construction is obtained from a known safe source, or adequately disinfected.

ITEM 27. DISINFECTION AFTER CONSTRUCTION AND REPAIR

Underground water supplies shall always be disinfected following new construction or repair work, to remove all traces of contamination.

Public health reason.—Water from newly developed ground water supplies and existing supplies which have been subjected to changes and repairs often shows an unsatisfactory sanitary quality as indicated by bacteriological examination of samples collected from the source. This is usually due to contamination from workmen, equipment, materials, or surface water which may be introduced into the ground water supply during the process of construction or repair work. While such contamination may not always be serious in itself, it obscures the meaning of the bacteriological test when present.

Satisfactory compliance.—This item shall be deemed to have been satisfied when:

(1) All new construction and repair work is disinfected with a chlorine solution containing not less than 50 p. p. m. of available chlorine: *Provided,* That where minor repairs are made to existing ground water supplies and adequate treatment of the water is provided beyond the point where repairs are made, disinfection shall not be mandatory.

(2) Not less than 5 p. p. m. of residual chlorine is present at the source and at other representative points which have been in contact

with the chlorine solution for a period of at least 3 hours, and preferably 10 hours or longer: *Provided,* That in the case of flowing springs and flowing wells this requirement shall not be mandatory. (See appendix B, Flowing Wells and Flowing Springs.)

(3) The system is thoroughly pumped or otherwise thoroughly flushed to remove all traces of chlorine after disinfection.

(4) The results of bacteriological examination of water samples collected after disinfection and flushing of newly developed ground water supplies show that all traces of contamination have been eliminated. Such tests shall be repeated at least once after the system is shown to be clean, to check on possible regrowths.

Refer to appendix B for recommended procedure for disinfection of springs and wells.

ITEM 28. BOTTLED WATERS

All bottled waters shall be so handled, from source to ultimate user, as to prevent contamination of such ground waters originally obtained from approved sources.

The provisions of this item shall not be interpreted as applying to carbonated waters, artificially prepared mineral water soft drinks, or similar beverages, but only to public ground water supplies, as defined in section 1, which are put into bottles or containers for the use of consumers: *Provided,* That the requirements of this item shall not be interpreted as replacing any provision of the Federal Food, Drug, and Cosmetic Act applying to beverages.

Public health reason.—Contamination of originally safe ground water supplies may occur in the processes of bottling, capping, handling, and reuse of containers. Therefore, special precautions should be taken to prevent such contamination.

Satisfactory compliance.—This item shall be deemed to have been satisfied when:

(1) Ground water sources used for bottling conform with the sanitation items for approved public ground water supplies given in this manual.

(2) Bottling is accomplished in a separate room equipped and used for this operation only.

(3) Bottling, capping, handling, and reuse of containers is carried out in such a manner that the final product ready for distribution in the container shall comply with the requirements of item 20 of this manual.

Specimens of bottled water collected for bacteriological analysis to determine compliance with this requirement should be taken at various places, including bottles in transit on delivery trucks, railroad cars, etc., to check on handling procedures and effectiveness of bottle washing.

APPENDIX A

Recommended Procedure for Cement Grouting of Wells for Sanitary Protection [1]

The annular space between the well casing and the well hole is one of the principal avenues through which undesirable water and pollutional matter may gain access to a well. The most satisfactory way of eliminating this hazard is to fill the annular space with cement grout. To accomplish this satisfactorily, careful attention should be given to see that:

(1) The grout mixture is properly prepared.

(2) The grout material is placed in one continuous mass.

(3) The grout material is placed upward from the bottom of the space to be grouted.

Concrete grout should be a mixture of cement, sand, and water in the proportion of 1 bag of cement (94 pounds), an equal volume of dry sand, and 5 to 6 gallons of clean water.

Neat cement grout should be a mixture of cement and water in the proportion of 1 bag of cement (94 pounds) and 5 to 6 gallons of clean water. Whenever possible, water content should be kept near the lower limit given. Hydrated lime to the extent of 10 percent of the volume of cement may be added to make the grout mix more fluid and thereby facilitate placement by the pumping equipment. Mixing of cement or cement and hydrated lime with the water must be thorough.

Grouting procedure.—The grout mixture must be placed in one continuous mass; hence, before starting the operation, sufficient materials should be on hand and other facilities available to accomplish the placement without interruption.

Restricted passages will result in clogging and failure to complete the grouting operation. The minimum clearance at any point, including couplings, should not be less than 1½ inches. When grouting through the annular space, the grout pipe should not be less than 1 inch nominal diameter. As the grout moves upward, it picks up much loose material such as results from caving. Accordingly, it is desirable to waste a suitable quantity of the grout which first emerges from the drill hole.

In grouting a well so that the material moves upward, there are two general procedures that may be followed: (1) The grout pipe may be installed within the well casing, or (2) in the annular space between the casing and drill hole, when there is sufficient clearance to permit this. In the latter case, the grout pipe is installed in the annular

[1] This information has been taken principally from a pamphlet of the Wisconsin State Board of Health entitled "Methods of Cement Grouting for Sanitary Protection of Wells." The subject is discussed in greater detail in that publication.

space to within a few inches of the bottom of the annular space. The grout is pumped through this pipe, discharging into the annular space, and moving upward, around the casing pipe, finally overflowing at the ground surface. In 3 to 7 days the grout will be set, and the well can be completed and pumping started.

When the grout pipe is installed within the well casing, the casing should be supported a few inches above the bottom during grouting, to permit grout to flow into the annular space. The well casing is fitted at the bottom with a cap threaded to receive the grout pipe and a check valve to prevent return of grout into the casing pipe. After grout appears at the surface, the casing pipe is lowered to the bottom. grout pipe unscrewed immediately and raised a few inches. A suitable quantity of water should then be pumped through it, thereby flushing any remaining grout from it and the casing pipe. The grout pipe is then removed from the well, and 3 to 7 days are allowed for setting of the grout. The well is then cleared by drilling out the cap, check valve, plug, and grout remaining within the well.

A modification of this procedure is the use of the well casing itself to convey the grout to the annular space. The casing pipe is suspended in the drill hole and held several feet off the bottom. A "spacer" is inserted in the casing pipe. The casing pipe is then capped and connection made from it to the grout pump. The estimated quantity of grout, including a suitable allowance for filling of crevices and other voids, is then pumped into the casing pipe. The spacer moves before the grout, in turn forcing the water in the well ahead of it. Arriving at the lower casing terminal, the spacer is forced to the bottom of the drill hole, leaving sufficient clearance to permit flow of grout into the annular space and upward through it.

After the desired amount of grout has been pumped into the casing pipe, the cap is removed, and a second spacer is inserted in the casing pipe. The cap is then replaced and a measured volume of water, sufficient to fill all but a few feet of the casing pipe, is pumped into it. Thus all but a small quantity of the grout is forced from the casing pipe into the annular space. From 3 to 7 days are allowed for setting of the grout. The spacers and grout remaining in the casing and drill hole are then drilled out and the well completed.

When the annular space is to be grouted for only part of the total depth of the well, the grouting can be carried out as directed above when the well reaches the desired depth, and the well then continued below this level, within the first casing. In this type of construction, where various-sized casings "telescope" within each other, a seal should be placed at the point of transition or "telescoping" in the annular space between the two casing pipes of different diameters. The annular space for grouting between two metal casings should be not less than 1½ inches and the depth of the seal not less than 8 feet.

APPENDIX B

Recommended Procedure for Disinfection of Wells, Springs, and Appurtenances

An effective and economical method of disinfecting wells, springs, and appurtenances is by the use of calcium hypochlorite (chlorinated lime) containing approximately 25 percent available chlorine. This material can be purchased at most drug stores and in larger quantities at chemical supply houses; a fresh supply should be used, since the chemical deteriorates on exposure to the atmosphere If commercial preparations of high-test calcium hypochlorite containing approximately 70 percent available chlorine are used, the required dosage will be about one-third the amount of chlorinated lime specified below.

To the amount of chlorinated lime specified in table 1, add small quantities of water slowly and stir until a smooth, watery paste free from lumps has been formed. Add from 5 to 20 gallons of water to the paste, and stir thoroughly from 10 to 15 minutes prior to allowing the solution to settle. The clearer liquid containing the chlorine should be used, and the inert material or lime that has settled to the bottom of the container discarded. The solution should be prepared in a thoroughly cleaned utensil; the use of metal containers should be avoided, if possible, since they are corroded by strong chlorine solutions.

Where small quantities of chlorinated lime are required and a scale is not available, the material can be measured with a spoon. A moderately heaping tablespoonful of chlorinated lime, that is, with the powder about 1 inch deep in the center, weighs approximately 1 ounce

TABLE 1.—*Liquid capacity of wells or spring structures and the amounts of chlorinated lime required to provide a dosage of approximately 50 parts per million of available chlorine*

Capacity of well or spring in gallons	Chlorinated lime required, in ounces	Approximate volume of water, in gallons, to be used in preparing chlorine solution
50	1.5	5
100	3.0	5
200	6.0	5
300	9.0	5
400	12.0	5
500	15.0	5
1,000	30.0	10
2,000	60.0	15
3,000	90.0	20

Spring basins.—(1) Wash the interior walls of the spring basin with a solution of chlorinated lime, using a stiff broom or brush to assure thorough cleaning, prior to placing the cover over the structure.

(2) Where a manhole opening is not provided in the cover, the proper amount of chlorinated lime solution should be poured into the basin and mixed with the water just before placing the cover over the structure. Care should be taken in placing the cover in position to prevent any extraneous material from entering the basin.

(3) Where a manhole is provided in the cover of the spring basin, the proper amount of chlorinated lime should be poured into the basin through the manhole opening and mixed with the water just before placing the cover over the manhole.

Shallow wells.—(1) After the casing or lining is completed, proceed as outlined below before the cover platform is placed over the well.

(*a*) Remove all equipment and materials including tools, forms, platforms, etc., which will not form a permanent part of the completed structure.

(*b*) Wash the interior walls of the casing or lining with a solution of chlorinated lime, using a stiff broom or brush to assure thorough cleaning.

(*c*) Pump the water from the well until it is perfectly clear, and remove the pumping equipment that was temporarily set up for this purpose.

(2) Place the cover over the well, and pour the required amount of chlorinated lime solution into the well through the manhole or pipe sleeve opening just prior to inserting the pump cylinder and drop pipe assembly. Care should be taken to distribute the chlorine solution over as much of the surface of the water as possible to obtain proper diffusion of the chemical with the well water.

(3) Wash the exterior surface of the pump cylinder and drop pipe with the chlorinated lime solution as the assembly is being lowered into the well.

(4) After the pump has been set in position, pump water from the well until a strong odor of chlorine is noted.

(5) Allow the chlorine solution to remain in the well for not less than 10 hours.

(6) After not less than 10 hours has elapsed, the well should be flushed by pumping the water to waste to remove all traces of chlorine.

Drilled and bored wells, flowing wells, and flowing springs.—(1) When the well is being tested for yield, the test pump should be operated until the well water is as clear and free from turbidity as possible.

(2) After the testing equipment has been removed, pour the required amount of chlorinated lime solution into the well slowly just prior to installing the permanent pumping equipment. Diffusion of the chemical with the well water may be facilitated by running the solution into the well through a hose or pipe line as the line is being alternately raised and lowered, and this method should be followed whenever possible.

(3) Wash the exterior surfaces of the pump cylinder and drop pipe with a chlorinated lime solution as the assembly is being lowered into the well.

(4) After the pump has been set in position, operate the pump until water discharged to waste has a distinct odor of chlorine. Repeat this procedure a few times after intervals of about 1 hour.

(5) When the chlorine solution has been completely circulated through the column of water in the well and the pumping equipment, allow the chlorine solution to remain in the well for not less than 10 hours.

(6) After not less than 10 hours have elapsed, the well should be flushed by pumping the water to waste to remove all traces of chlorine. The pump should be operated until water discharged to waste is free from the odor of chlorine.

In the case of deep wells having a high water level, it may be necessary to resort to special methods of introducing the disinfecting agent into the well so as to insure proper diffusion of chlorine throughout the well. A method readily available is to place chlorinated lime or high test granulated calcium hypochlorite in a short section of pipe capped at both ends. A number of small holes should be drilled through each cap and one of the caps fitted with an eye to facilitate attachment of a suitable cable. The disinfecting agent is distributed by lowering and raising the pipe section throughout the depth of the water. In the case of flowing wells and flowing springs, the pipe section should be moved up and down near the bottom of the well or spring. The water moving upward through the well or spring will carry with it the disinfecting agent released at the bottom. It is impractical to maintain chlorine in flowing wells and springs for 10 hours as specified in paragraph (5) above. Sufficient chlorine, therefore, should be applied to maintain a chlorine residual of 50 p. p. m. in the water flowing from the well or spring for at least 20 minutes. If bacteriological results on water samples collected after all traces of chlorine have disappeared indicate that the water is not safe to use, the disinfection procedure should be repeated until satisfactory results are obtained or else the supply should be chlorinated continuously or abandoned.

Sometimes an existing well is encountered which does not respond to the usual methods of sterilization. Usually a well like this has been polluted by water which entered the well under sufficient head to cause a flow of water from the well into the water-bearing formation, carrying the pollution with it. To reach the bacteria which have thus been carried into the water-bearing formation, it is necessary to force chlorine into the formation. This may be done in a number of ways, depending on the construction of the well. In some wells, it is advisable to chlorinate the water in the well and then add a consider-

able volume of chlorinated water in order to force the treated water into the formation. In other wells, such as the drilled well cased with standard weight casing pipe, it is entirely practicable to chlorinate the water in the well, then cap the well and apply a head of air. By alternately applying and releasing the air, a vigorous surging effect is obtained, and chlorinated water is forced into the water-bearing formation. After treating a well in this manner it is necessary, of course, to flush it to remove the chlorine.

Should the reports on the bacteriological examination of water samples be unsatisfactory after disinfection, it would indicate that the initial treatment was ineffective. In this case, the procedure should be repeated until tests show that water samples from that portion of the system being disinfected are satisfactory from a bacteriological standpoint.

The water from the system should not be used for domestic and culinary purposes until the report on the bacteriological examination of water samples indicates that the water is safe for domestic use.

DEATHS DURING WEEK ENDED JANUARY 22, 1944

[From the Weekly Mortality Index, issued by the Bureau of the Census, Department of Commerce]

	Week ended Jan. 22, 1944	Corresponding week, 1943
Data for 90 large cities of the United States.		
Total deaths	10,359	10,066
Average for 3 prior years	9,905	
Total deaths, first 3 weeks of year	35,219	31,083
Deaths under 1 year of age	579	713
Average for 3 prior years	604	
Deaths under 1 year of age, first 3 weeks of year	1,952	2,252
Data from industrial insurance companies:		
Policies in force	66,222,332	65,281,877
Number of death claims	19,037	14,910
Death claims per 1,000 policies in force, annual rate	15.0	11.9
Death claims per 1,000 policies, first 3 weeks of year, annual rate	12.9	11.2

PREVALENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED JANUARY 29, 1944

Summary

The incidence of influenza declined for the third consecutive week. A total of 22,483 cases was reported, or less than half the number (47,143) reported for the preceding week. The comparable 5-year (1939–43) median is 4,899. The largest comparable weekly figure during that period was 91,203 cases, reported in 1941. Declines occurred during the current week in all geographic areas of the country. States reporting more than 1,000 cases, all showing sharp declines, are as follows: Virginia, 2,404, North Carolina 1,878, Alabama 1,264, Louisiana 1,990, Texas 5,990, and Utah 1,115. The cumulative total for the first 4 weeks of the year is 261,981, as compared with the 5-year median of 17,421 and 371,988 for the corresponding period in 1941.

The incidence of meningococcus meningitis continues at a high level. A total of 527 cases was reported for the current week, as compared with 522 last week, 399 for the corresponding week last year, and 55 for the 5-year median. Of the current total, 437 cases occurred in 19 States which reported 10 or more cases each. An aggregate of 313 cases was reported in 9 States which recorded more than 16 cases each as follows (last week's figures in parentheses): *Increases*—New Jersey 25 (12), Michigan 29 (27), Missouri 34 (12), Tennessee 37 (20), California 39 (31); *decreases*—New York 56 (68), Ohio 24 (31), Texas 28 (30); *no change*—Pennsylvania 41.

The incidence of scarlet fever and measles is above that for both last year and the 5-year medians. During the current week, 4,936 cases of scarlet fever and 15,403 cases of measles were reported, representing an incidence 32 percent and 42 percent, respectively, above the 5-year medians. The higher incidence of scarlet fever than last year is reported for all geographic areas except the New England and West South Central. Approximately three times as many cases were

reported currently in the Pacific States as for the corresponding week last year. A total of 17,066 cases of scarlet fever has been reported to date as compared with 14,150 for the same period last year, and 49,851 cases of measles as compared with 36,101 last year. Typhoid fever is slightly above both last year's incidence and the 5-year median. Of 79 cases reported currently, 32 cases occurred in Indiana.

The total numbers of reported cases of diphtheria, poliomyelitis, smallpox, and whooping cough, both currently and for the first 4 weeks of the year, are below the respective corresponding 5-year medians.

Deaths registered in 90 large cities of the United States for the current week totaled 9,954, as compared with 10,359 for the preceding week and a 3-year (1941–43) average of 9,786. The total for the first 4 weeks of the year is 45,173, as compared with 41,264 for the same period of 1943.

Telegraphic morbidity reports from State health officers for the week ended January 29, 1944, and comparison with corresponding week of 1943 and 5-year median

In these tables a zero indicates a definite report, while leaders imply that, although none was reported, cases may have occurred.

Division and State	Diphtheria			Influenza			Measles			Meningitis, meningococcus		
	Week ended		Median 1939–43	Week ended		Median 1939–43	Week ended		Median 1939–43	Week ended		Median 1939–43
	Jan. 29, 1944	Jan. 30, 1943		Jan. 29, 1944	Jan. 30, 1943		Jan. 29, 1944	Jan. 30, 1943		Jan. 29, 1944	Jan. 30, 1943	
NEW ENGLAND												
Maine	0	0	0	41	----	10	227	6	34	3	12	0
New Hampshire	0	0	0	----	----	----	9	34	6	1	2	0
Vermont	1	0	0	19	----	----	19	324	22	0	0	0
Massachusetts	7	2	4		----	----	377	496	341	16	10	2
Rhode Island	0	0	0	24		----	279	22	22	5	23	1
Connecticut	3	0	1	53	14	4	185	372	164	8	3	1
MIDDLE ATLANTIC												
New York	8	12	24	[1] 15	[1] 14	[1] 16	928	1,395	1,214	56	29	4
New Jersey	4	1	8	21	21	24	913	431	28	25	13	1
Pennsylvania	8	8	13	20	2		1,272	2,458	1,137	41	15	7
EAST NORTH CENTRAL												
Ohio	7	12	12	72	9	15	2,814	111	111	24	5	2
Indiana	7	8	14	134	6	25	267	192	61	6	8	1
Illinois	15	14	25	68	4	30	436	273	120	16	7	0
Michigan [2]	6	6	6	32	1	2	1,132	135	354	20	6	1
Wisconsin	1	6	5	601	93	64	1,099	449	286	12	13	1
WEST NORTH CENTRAL												
Minnesota	7	5	3	----	2	3	710	19	235	2	2	0
Iowa	5	3	3	251	----	6	246	86	109	1	0	0
Missouri	3	6	5	5	6	26	99	96	26	34	14	2
North Dakota	1	1	2	14	23	23	275	42	42	1	0	0
South Dakota	0	6	5		----	2	158	154	39	0	1	0
Nebraska	5	0	2	3	18	1	19	201	32	1	1	0
Kansas	7	5	5	54	10	10	153	101	213	9	6	0
SOUTH ATLANTIC												
Delaware	2	0	1		----	----	10	12	1	2	1	0
Maryland [2]	10	9	6	267	13	13	217	32	32	7	20	1
District of Columbia	3	1	1	5	4	4	60	51	11	3	4	1
Virginia	8	5	10	2,404	567	617	270	122	135	15	18	5
West Virginia	2	8	8	354	15	41	200	4	11	2	0	1
North Carolina	11	11	18	45	12	66	460	14	87	11	8	2
South Carolina	8	4	8	1,878	678	678	144	7	11	9	11	1
Georgia	7	7	7	408	154	183	284	27	39	8	5	0
Florida	2	11	6	76	7	10	95	11	33	11	1	1
EAST SOUTH CENTRAL												
Kentucky	8	4	8	845	19	27	[3]97	226	48	12	5	2
Tennessee	7	1	3	419	105	109	357	133	48	37	2	2
Alabama	6	13	12	1,264	379	644	349	11	62	10	7	3
Mississippi [2]	7	11	7	----	----	----	----	----	----	11	8	1
WEST SOUTH CENTRAL												
Arkansas	9	5	8	862	150	267	42	120	63	3	2	1
Louisiana	5	8	8	1,990	7	26	32	69	39	10	7	1
Oklahoma	2	12	11	661	141	193	0	11	11	3	0	1
Texas	30	70	53	5,990	1,900	1,900	340	147	147	28	12	3
MOUNTAIN												
Montana	1	2	2	517	25	25	246	84	77	3	0	0
Idaho	0	0	0	----	----	1	27	97	64	0	1	0
Wyoming	0	0	1	205	43	37	51	21	20	0	0	0
Colorado	8	9	9	298	113	50	226	230	57	8	3	0
New Mexico	3	3	2	32	4	10	6	21	29	0	1	0
Arizona	4	3	3	543	155	155	112	15	15	2	1	1
Utah [2]	0	1	0	1,115	9	15	5	516	40	0	4	0
Nevada	1	0	0	10	1	----	1	8	0	0	0	0
PACIFIC												
Washington	6	9	2	3	1	13	88	810	113	5	13	0
Oregon	8	4	2	157	35	53	68	448	147	8	7	1
California	41	35	24	705	89	155	499	243	389	39	28	2
Total	294	341	354	22,483	4,852	4,899	15,403	10,887	10,844	527	339	55
4 weeks	1,059	1,355	1,481	261,981	17,421	17,421	[3]49,851	36,101	36,328	2,274	1,282	210

See footnotes at end of table.

Telegraphic morbidity reports from State health officers for the week ended January 29, 1944, and comparison with corresponding week of 1943 and 5-year median—Con.

Division and State	Poliomyelitis			Scarlet fever			Smallpox			Typhoid and paratyphoid fever [4]		
	Week ended		Median 1939-43	Week ended		Median 1939-43	Week ended		Median 1939-43	Week ended		Median 1939-43
	Jan. 29, 1944	Jan. 30, 1943		Jan. 29, 1944	Jan. 30, 1943		Jan. 29, 1944	Jan. 30, 1943		Jan. 29, 1944	Jan. 30, 1943	
NEW ENGLAND												
Maine	0	1	0	33	8	13	0	0	0	2	0	1
New Hampshire	0	0	0	14	11	8	0	0	0	0	1	0
Vermont	0	0	0	11	4	6	0	0	0	0	0	0
Massachusetts	0	3	0	314	416	194	0	0	0	0	2	2
Rhode Island	0	0	0	13	29	10	0	0	0	0	0	0
Connecticut	0	0	0	86	65	65	0	0	0	0	2	1
MIDDLE ATLANTIC												
New York	0	1	1	391	416	440	0	0	0	3	3	3
New Jersey	0	0	0	142	88	177	0	0	0	1	1	0
Pennsylvania	0	0	0	341	0	348	0	0	0	3	5	6
EAST NORTH CENTRAL												
Ohio	0	1	1	314	318	330	2	2	1	8	0	1
Indiana	3	0	0	90	126	157	0	12	7	32	2	2
Illinois	2	0	1	257	201	410	0	0	0	1	1	1
Michigan [2]	0	0	0	230	100	207	0	1	1	0	2	2
Wisconsin	0	0	0	303	264	214	0	1	2	0	1	1
WEST NORTH CENTRAL												
Minnesota	0	1	0	157	67	93	0	0	3	0	0	1
Iowa	0	0	0	96	63	63	1	1	[illegible]	1	0	1
Missouri	0	0	0	93	110	91	0	0	2	0	0	1
North Dakota	0	0	0	13	16	19	0	0	0	0	0	0
South Dakota	0	0	0	42	38	29	0	0	0	0	0	0
Nebraska	0	0	0	74	23	34	0	0	0	0	0	0
Kansas	1	0	0	87	58	90	1	0	1	0	0	0
SOUTH ATLANTIC												
Delaware	0	0	0	8	6	13	0	0	0	0	0	0
Maryland [2]	1	0	0	113	81	75	0	0	0	1	1	2
District of Columbia	0	0	0	131	29	13	0	0	0	0	1	0
Virginia	0	0	0	74	45	50	2	0	0	1	5	3
West Virginia	0	0	0	48	27	56	0	0	0	0	0	0
North Carolina	0	1	1	56	63	58	0	0	0	0	1	0
South Carolina	0	0	1	10	12	7	0	0	0	1	0	1
Georgia	0	0	0	23	33	25	0	1	1	4	2	3
Florida	0	1	1	25	11	7	0	0	0	4	0	0
EAST SOUTH CENTRAL												
Kentucky	0	2	1	64	50	66	0	0	0	0	0	0
Tennessee	3	0	0	41	43	54	0	0	1	3	2	2
Alabama	0	1	1	12	16	16	2	2	0	1	0	2
Mississippi [2]	0	0	0	15	11	8	1	0	1	0	1	1
WEST SOUTH CENTRAL												
Arkansas	0	1	0	4	7	8	0	2	1	0	2	2
Louisiana	0	1	1	8	10	10	0	0	0	4	4	4
Oklahoma	0	0	0	5	29	29	0	0	0	0	1	1
Texas	4	5	1	65	56	64	1	0	5	3	2	4
MOUNTAIN												
Montana	0	0	0	53	9	24	0	0	0	0	0	0
Idaho	0	0	0	37	3	4	0	0	0	0	0	0
Wyoming	0	0	0	14	53	12	0	0	0	0	0	0
Colorado	2	1	0	68	79	41	0	0	4	0	1	1
New Mexico	0	0	0	6	7	9	0	1	1	2	0	1
Arizona	0	0	0	14	5	5	0	0	0	0	0	0
Utah [2]	0	0	0	199	59	25	0	0	0	0	0	0
Nevada	0	0	0	1	0	0	0	0	0	0	0	0
PACIFIC												
Washington	2	1	1	238	25	29	1	0	0	0	1	1
Oregon	0	1	0	78	20	20	0	0	0	2	0	0
California	11	9	2	419	191	191	1	1	2	2	2	2
Total	29	31	31	4,936	3,401	3,746	12	24	47	79	46	72
4 weeks	119	136	136	17,066	14,150	14,150	49	127	189	253	201	315

See footnotes at end of table

Telegraphic morbidity reports from State health officers for the week ended January 29, 1944, and comparison with corresponding week of 1943 and 5-year median—Con

Division and State	Whooping cough: Week ended Jan 29 1944	Whooping cough: Week ended Jan 30 1943	Whooping cough: Median 1939–43	Week ended Jan 29 1944: Anthrax	Dysentery: Amebic	Dysentery: Bacillary	Dysentery: Unspecified	Encephalitis infectious	Leprosy	Rocky Mt spotted fever	Tularemia	Typhus fever
NEW ENGLAND												
Maine	6	81	4[illegible]	0	0	0	0	0	0	0	0	0
New Hampshire	9	18	7	0	0	0	0	0	0	0	0	0
Vermont	10	34	57	0	0	0	0	0	0	0	0	0
Massachusetts	99	173	18[illegible]	0	0	1	0	0	0	0	1	0
Rhode Island	2	24	24	0	0	0	0	0	0	0	0	0
Connecticut	17	71	89	0	0	2	0	0	0	0	0	0
MIDDLE ATLANTIC												
New York	16[illegible]	388	40[illegible]	0	4	11	0	0	0	0	0	0
New Jersey	[illegible]	150	150	0	5	0	0	0	0	0	0	0
Pennsylvania	114	379	379	0	0	0	0	0	0	0	0	0
EAST NORTH CENTRAL												
Ohio	114	277	277	0	0	0	0		0	0	0	0
Indiana	20	22	22	0	0	2	0	0	0	0	1	0
Illinois	91	188	188	0	0	0	0	1	0	0	0	0
Michigan [4]	14[illegible]	326	2[illegible]2	0	0	0	0	0	0	0	0	0
Wisconsin	9[illegible]	210	210	0	0	0	0	0	0	0	0	0
WEST NORTH CENTRAL												
Minnesota	3[illegible]	71	[illegible]2	0	0	0	0	0	0	0	0	0
Iowa	14	18	18	0	0	0	0	0	0	0	0	0
Missouri	14	28	[illegible]3	0	0	0	0	0	0	0	0	0
North Dakota	4	11	11	0	0	0	0	0	0	0	0	0
South Dakota	[illegible]	0	3	0	0	0	0	0	0	0	0	0
Nebraska	0	3	3	0	0	0	0	0	0	0	0	0
Kansas	36	43	43	0	1	0	0	1	0	0	0	0
SOUTH ATLANTIC												
Delaware	0	7	7	0	0	0	0	0	0	0	0	0
Maryland [2]	29	73	[illegible]3	0	0	0	0	0	0	0	0	0
District of Columbia	[illegible]	10	10	0	0	0	0	0	0	0	0	0
Virginia	[illegible]	56	[illegible]4	0	0	0	35	0	0	0	0	1
West Virginia	30	[illegible]1	49	0	0	0	0	0	0	0	0	0
North Carolina	1[illegible]2	99	218	0	0	0	0	0	0	0	0	3
South Carolina	[illegible]2	31	[illegible]	0	0	[illegible]	0	0	0	0	0	1
Georgia	14	27	27	0	0	0	0	0	0	0	3	16
Florida	1[illegible]	26	11	0	2	0	0	0	0	0	0	1
EAST SOUTH CENTRAL												
Kentucky	84	50	50	0	1	1	0	0	0	0	0	0
Tennessee	31	53	22	0	0	0	1	0	0	0	3	2
Alabama	12	41	26	0	0	0	0	1	0	0	0	5
Mississippi [2]				0	0	0	0	0	0	0	0	0
WEST SOUTH CENTRAL												
Arkansas	1[illegible]	35	1[illegible]	0	1	[illegible]	0	0	0	0	0	0
Louisiana	1[illegible]	10	5	0	1	1	0	1	1	0	1	0
Oklahoma	1	7	7	0	0	0	0	0	0	0	0	0
Texas	133	295	139	0	2	1[illegible]	0	0	0	0	[illegible]	14
MOUNTAIN												
Montana	19	45	14	0	0	0	0	0	0	0	0	0
Idaho	5	2	6	0	0	0	0	0	0	0	0	0
Wyoming	13	4	4	0	0	0	0	0	0	0	0	0
Colorado	38	22	32	0	0	0	0	0	0	0	0	0
New Mexico	3	24	39	0	0	0	0	0	0	0	0	0
Arizona	31	14	12	0	0	0	19	0	0	0	0	0
Utah [2]	13	32	37	0	0	0	0	0	0	0	0	0
Nevada	0	0	0	0	0	0	0	0	0	0	0	0
PACIFIC												
Washington	49	28	29	0	0	0	0	0	0	0	0	0
Oregon	34	10	16	0	0	0	0	0	0	0	0	0
California	80	266	202	0	1	2	0	0	0	0	1	0
Total	2 018	3 846	4 237	0	18	205	55	4	1	0	12	43
4 weeks	7 069	15 883	17 010	3	99	1 015	214	34	3	0	54	199
4 weeks, 1943				7	74	571	151	35	4	1	89	262

[1] New York City only
[2] Period ended earlier than Saturday
[3] Later information shows 152 cases of measles in Kentucky for the week ended Jan 15 1944 instead of 18 as previously reported
[4] Including paratyphoid fever cases reported separately as follows South Carolina, 1, Georgia, 1, Florida, 3

WEEKLY REPORTS FROM CITIES

City reports for week ended January 15, 1944

This table lists the reports from 86 cities of more than 10,000 population distributed throughout the United States, and represents a cross section of the current urban incidence of the diseases included in the table.

	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
NEW ENGLAND												
Maine:												
Portland	0	0	----	0	10	1	7	0	7	0	0	3
New Hampshire:												
Concord	0	0		1	1	0	2	0	0	0	0	0
Vermont:												
Barre	0	0	-----	0	0	0	0	0	0	0	0	0
Massachusetts												
Boston	4	0	----	1	30	20	40	0	70	0	0	24
Fall River	0	0	----	0	0	0	1	0	6	0	0	2
Springfield	0	0	---	0	34	0	1	0	11	0	0	8
Worcester	0	0	--	2	7	3	19	0	50	0	0	3
Rhode Island												
Providence	1	0		3	131	2	14	0	3	0	1	1
Connecticut												
Bridgeport	0	0	33	1	0	2	0	0	2	0	0	2
Hartford	3	0	-	1	1	4	5	0	2	0	0	1
New Haven	0	0	---	1	4	1	3	0	[illegible]	0	0	0
MIDDLE ATLANTIC												
New York:												
Buffalo	0	0		2	6	2	12	0	6	0	1	0
New York	7	1	28	11	545	72	123	0	202	0	1	31
Rochester	0	0		0	0	1	15	0	4	0	0	9
Syracuse	2	0		1	0	1	5	0	8	0	0	17
New Jersey:												
Camden	0	0	2	2	1	0	4	0	7	0	0	0
Newark	0	0	8	1	32	3	10	0	12	0	0	10
Trenton	0	1	6	3	1	1	1	0	7	0	0	0
Pennsylvania												
Philadelphia	2	1	38	16	6	16	59	0	35	0	0	7
Pittsburgh	0	0	28	15	280	6	36	0	19	0	1	9
Reading	0	0	1	4	1	1	0	0	3	0	0	1
EAST NORTH CENTRAL												
Ohio:												
Cincinnati	3	0	4	8	13	5	0	0	37	0	0	5
Cleveland	0	0	15	2	250	5	22	0	66	0	1	19
Columbus	0	0	6	6	19	0	11	0	10	0	0	3
Indiana:												
Fort Wayne	0	0	---	1	22	0	5	0	0	0	0	0
Indianapolis	4	0	----	1	1	3	20	0	28	0	0	14
South Bend	0	0	----	0	25	0	0	0	1	0	0	0
Terre Haute	0	0	----	1	0	0	1	0	0	0	0	0
Illinois:												
Chicago	1	0	7	5	29	12	40	0	91	0	1	27
Springfield	0	0	------	0	18	0	5	0	3	0	0	0
Michigan:												
Detroit	3	0	15	3	27	9	32	0	44	0	1	19
Flint	0	0	----	0	0	1	0	0	2	0	0	0
Grand Rapids	0	0	----	2	80	3	5	0	7	0	0	0
Wisconsin:												
Kenosha	0	0		1	0	0	0	0	8	0	0	4
Milwaukee	0	0	1	1	12	3	5	0	47	0	0	26
Racine	0	0	1	1	1	0	0	0	11	0	0	2
Superior	0	0	------	0	53	2	3	0	2	0	0	1
WEST NORTH CENTRAL												
Minnesota:												
Duluth	0	0	-----	1	6	0	1	0	17	0	0	13
Minneapolis	0	0	-----	1	161	2	5	0	27	0	0	6
St. Paul	2	0	------	1	48	4	9	0	23	0	0	8
Missouri:												
Kansas City	0	0	------	6	2	3	19	0	18	0	1	5
St. Joseph	0	0	------	0	0	0	0	0	1	1	0	0
St. Louis	0	0	20	4	25	15	26	1	14	0	0	4

City reports for week ended January 15, 1944—Continued

	Diphtheria cases	Encephalitis, infectious, cases	Influenza Cases	Influenza Deaths	Measles cases	Meningitis meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
WEST NORTH CENTRAL—continued												N
North Dakota												
Fargo	0	0		1	66	0	3	0	2	1	0	0
Nebraska												
Omaha	1	0		2	1	0	14	0	11	0	0	0
Kansas												
Topeka	0	0		0	0	1	2	0	2	0	0	5
Wichita	0	0	4	1	38	0	11	0	3	0	0	0
SOUTH ATLANTIC												
Delaware												
Wilmington	1	0		0	5	1	2	0	0	0	0	0
Maryland												
Baltimore	2	0	13	8	66	4	25	0	34	0	0	13
Cumberland	0	0	2	0	0	0	1	0	0	0	0	0
Frederick	0	0		0	0	0	2	0	0	0	0	0
District of Columbia												
Washington	0	0	62	2	31	1	24	0	60	0	0	6
Virginia												
Lynchburg	0	0	70	0	33	1	3	0	1	0	0	0
Richmond	0	0	7	5	8	5	4	1	6	0	0	1
Roanoke	0	0		0	7	0	2	0	0	0	0	1
West Virginia												
Charleston	0	0		0	0	0	0	0	2	0	0	0
Wheeling	0	0	5	0	0	0	3	0	2	0	0	2
North Carolina												
Wilmington	0	0	4	0	4	0	1	0	0	0	0	0
Winston Salem	0	0		0	57	0	0	0	0	0	0	2
South Carolina												
Charleston	0	0	366	2	6	1	2	0	3	0	0	1
Georgia												
Atlanta	1	0	34	6	0	2	6	0	4	0	0	1
Brunswick	0	0		0	56	1	0	0	2	0	0	0
Savannah	0	0	60	9	0	1	4	0	0	0	0	0
EAST SOUTH CENTRAL												
Tennessee												
Memphis	0	0	22	2	8	8	5	0	8	0	0	3
Nashville	0	0		11	2	4	8	0	3	0	0	0
Alabama												
Birmingham	0	0	415	5	18	1	12	0	4	0	0	1
Mobile	0	1	998	5	1	1	6	0	0	0	0	0
WEST SOUTH CENTRAL												
Arkansas												
Little Rock	0	0	89	1	5	0	2	0	0	0	0	2
Louisiana												
New Orleans	0	0	169	11	10	2	16	0	2	0	1	1
Shreveport	0	0		10	0	0	4	0	2	0	1	0
Texas												
Dallas	1	0	5		2	1	12	0	1	0	0	0
Houston	1	0		3	0	0	9	0	1	0	0	0
San Antonio	0	0	11	8	3	0	2	0	0	0	0	0
MOUNTAIN												
Montana												
Billings	0	0		0	2	0	0	0	1	0	0	0
Great Falls	0	0	181	1	18	0	0	0	5	0	0	0
Helena	0	0		0	2	1	3	0	2	0	0	0
Missoula	0	0	150	0	0	0	6	0	1	0	0	0
Idaho												
Boise	0	0	77	0	0	0	0	0	0	0	0	1
Colorado												
Denver	5	0	22	1	12	1	11	0	12	0	0	19
Pueblo	0	0		0	80	0	4		1	0	0	2

City reports for week ended January 15, 1944—Continued

	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
PACIFIC												
Washington												
Seattle	1	0		6	0	0	9	0	8	0	0	11
Spokane	0	0	7	6	24	0	5	0	21	0	0	3
Tacoma	0	0		3	4	1	3	0	75	0	0	2
California												
Los Angeles	5	0	174	0	30	3	18	1	27	0	1	5
Sacramento	1	0	16	3	3	0	3	0	1	0	0	0
San Francisco	2	0	188	[illegible]	2	3	14	0	25	0	0	4
Total	[illegible]	4	3 [illegible]	210	[illegible] 481	212	8[illegible]0	3	1,251	2	11	370
Corresponding week, 1943	[illegible]	2	3 [illegible]8	50	2 0[illegible]	88	[illegible]05	7	1,252	1	6	1,201
Average, 1939–43	[illegible]9		1,918	[1] [illegible]8	2,201		[1] 563		1,130	11	15	1,097

Anthrax.—Cases: San Francisco, 1.
Dysentery, amebic.—Cases: New York, 2; San Francisco, 1.
Dysentery, bacillary.—Cases: New York, 17; Chicago, 1; Charleston, S. C., 1; Memphis, 1; Los Angeles, 8.
Dysentery, unspecified.—Cases: Richmond, 1; San Antonio, 1.
Tularemia.—Cases: Lynchburg, 1; Nashville, 1.
Typhus fever.—Cases: Charleston, S. C., 1; Savannah, 2; Birmingham, 1; New Orleans, 1; San Antonio, 1; Los Angeles, 1.

[1] 3-year average, 1941–43.
[2] 5-year median.

Rates (annual basis) per 100,000 population, by geographic groups, for the 86 cities in the preceding table (estimated population, 1942, 34,391,800)

	Diphtheria case rates	Encephalitis, infectious, case rates	Influenza		Measles case rates	Meningitis, meningococcus, case rates	Pneumonia death rates	Poliomyelitis case rates	Scarlet fever case rates	Smallpox case rates	Typhoid and paratyphoid fever case rates	Whooping cough case rates
			Case rates	Death rates								
New England	19.9	0.0	82	21.9	543	82.2	229.2	0.0	391	0.0	2.5	110
Middle Atlantic	4.9	1.3	50	24.0	390	46.1	118.5	0.0	136	0.0	1.3	38
East North Central	6.4	0.0	29	18.7	322	25.2	87.2	0.0	209	0.0	1.8	70
West North Central	5.9	0.0	47	33.3	680	49.0	176.4	2.0	231	3.9	2.0	80
South Atlantic	7.1	0.0	1,465	57.0	486	30.3	140.6	1.8	203	0.0	0.0	48
East South Central	0.0	6.0	8,547	137.0	143	53.6	184.6	0.0	89	0.0	0.0	24
West South Central	6.1	0.0	837	116.1	61	9.2	207.7	0.0	18	0.0	6.1	9
Mountain	53.0	0.0	4,556	21.2	1,208	21.2	254.3	0.0	233	0.0	0.0	233
Pacific	15.7	0.0	675	54.3	110	12.3	91.1	1.8	275	0.0	1.8	44
Total	8.1	0.6	542	36.5	377	36.8	129.2	0.5	190	0.3	1.7	56

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases Week ended January 1, 1944 —During the week ended January 1, 1944, cases of certain communicable diseases were reported by the Dominion Bureau of Statistics of Canada as follows

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox		4		22	320	77	101	69	135	728
Diphtheria		11	4	9	2	11	2	1		40
Dysentery (bacillary)				2						2
German measles		1		3	9		5	2	3	23
Influenza		523	270		920	45			1 550	3 308
Measles		8		15	97	18	20	60	17	235
Meningitis meningococcus		1			7	1			2	11
Mumps		6			150	52	7	14	38	267
Scarlet fever		6	6	17	133	56	[illegible]	30	42	[illegible]
Tuberculosis (all forms)		2	8	3	49	10	5	16	73	166
Typhoid and paratyphoid fever		3		4	1	1			1	10
Undulant fever						1				1
Whooping cough		12		8	73	6	18	2	10	129

CUBA

Habana—Communicable diseases—4 weeks ended January 8, 1944 —During the 4 weeks ended January 8, 1944, certain communicable diseases were reported in Habana, Cuba, as follows

Disease	Cases	Deaths	Disease	Cases	Deaths
Diphtheria	34		Scarlet fever	1	
Malaria	8		Tuberculosis	4	3
Measles	22		Typhoid fever	2[illegible]	4

GERMANY

Vital statistics—First 9 months of 1943 —During the first 9 months of 1943, a total of 995,774 births was reported in greater Germany which was an increase of 42,000 births over the corresponding period of 1942

The number of deaths reported for the same period amounted to 715,257 excluding deaths in the army and civilians killed by enemy action The death rate per 1,000 is 11 8 as compared with 12 3 for the same period of 1942.

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

NOTE.—Except in cases of unusual prevalence, only those places are included which had not previously reported any of the above-named diseases, except yellow fever, during the current year. All reports of yellow fever are published currently.

A cumulative table showing the reported prevalence of these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday of each month.

(Few reports are available from the invaded countries of Europe and other nations in war zones.)

Smallpox

Algeria.—For the period December 1-10, 1943, 122 cases of smallpox were reported in Algeria.

Indochina.—For the period December 1-20, 1943, 204 cases of smallpox were reported in Indochina.

Mexico—Torreon.—Smallpox has been reported in Torreon, Mexico, as follows: Week ended January 8, 1944, 9 cases; week ended January 15, 1944, 10 cases. Precautionary measures are being taken.

Typhus Fever

Algeria.—For the period December 1–10, 1943, 33 cases of typhus fever were reported in Algeria.

Curaçao.—During the week ended January 8, 1944, 1 case of typhus fever was reported in Curaçao.

Hungary.—During the week ended December 4, 1943, 19 cases of typhus fever were reported in Hungary

Rumania.—For the period December 16, 1943, to January 7, 1944, 690 cases of typhus fever were reported in Rumania.

Spain.—During the week ended November 27, 1943, 19 cases of typhus fever were reported in Spain.

Yellow Fever

Cape Verde Islands—Praia.—On January 18, 1944, 1 case of suspected yellow fever was reported in Praia, Cape Verde Islands.

On vessel—At Lisbon.—According to information dated January 21, 1944, it is reported that a vessel which called at the islands of São Tomé and Cape Verde has arrived at Lisbon, Portugal, with cases of yellow fever on board. São Tomé is a small island near the Equator and west of French Equatorial Africa.

FEDERAL SECURITY AGENCY

UNITED STATES PUBLIC HEALTH SERVICE

THOMAS PARRAN, *Surgeon General*

DIVISION OF PUBLIC HEALTH METHODS

G. ST. J. PERROTT, *Chief of Division*

The PUBLIC HEALTH REPORTS, first published in 1878 under authority of an act of Congress of April 29 of that year, is issued weekly by the United States Public Health Service through the Division of Public Health Methods, pursuant to the following authority of law: United States Code, title 42, sections 7, 30, 93; title 44, section 220.

It contains (1) current information regarding the prevalence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health

The PUBLIC HEALTH REPORTS is published primarily for distribution, in accordance with the law, to health officers, members of boards or departments of health, and other persons directly or indirectly engaged in public health work. Articles of special interest are issued as reprints or as supplements, in which forms they are made available for more economical and general distribution.

Requests for and communications regarding the PUBLIC HEALTH REPORTS, reprints, or supplements should be addressed to the Surgeon General, United States Public Health Service, Washington, D. C. Subscribers should remit direct to the Superintendent of Documents, Washington, D. C.

Librarians and others should preserve their copies for binding, as the Public Health Service is unable to supply the general demand for bound copies. Indexes will be supplied upon request.

UNITED STATES GOVERNMENT PRINTING OFFICE, WASHINGTON : 1944

For sale by the Superintendent of Documents, Washington, D. C.

Price 5 cents. Subscription price $2.50 a year

Public Health Reports

VOLUME 59 FEBRUARY 11, 1944 NUMBER 6

IN THIS ISSUE

Inventory of Needs for Milk Pasteurization Facilities

Report of a Study on the Health of Student Nurses

CONTENTS

Public Health Reports

Vol. 59 • FEBRUARY 11, 1944 • *No. 6*

NATIONAL INVENTORY OF NEEDS FOR SANITATION FACILITIES

II. MILK PASTEURIZATION FACILITIES

By JOHN ANDREWS, *Passed Assistant Sanitary Engineer* (*R*), and A. W. FUCHS, *Sanitary Engineer Director, United States Public Health Service* [1]

INTRODUCTION

Adequate supervision of the milk supply is one of the important functions of public health agencies. Of all the factors of man's environment, none is more important to his welfare than food. Of all foods, none is more important than milk. That milk should be clean and safe for human consumption is obvious. That its cleanliness and safety must be insured by governmental control has long been recognized. In the United States today such sanitary control is being exercised on a very considerable scale.

Of all the protective measures which are applied to milk, proper pasteurization is by far the most important single safeguard. Milk which has been properly produced, properly pasteurized, and protected against subsequent contamination, is safe milk. No raw milk can be guaranteed as safe. In most sections of the United States, pasteurized milk is now available, but there are still many areas in which there is no pasteurized milk. In these areas the public health responsibility of insuring a safe milk supply cannot be discharged until properly pasteurized milk is available in sufficient quantity. This section of the National Inventory of Needs for Sanitation Facilities is concerned, therefore, with an appraisal of the needs for additional pasteurizing facilities.

Before discussing the inventory in detail, it is desirable to sketch very briefly the past and present toll from milk-borne disease, the development and present status of pasteurization, and the public health results of pasteurization.

[1] Milk and Food Section, Sanitary Engineering Division.

MILK-BORNE DISEASE IN THE UNITED STATES

Each year between 30 and 50 outbreaks of milk-borne disease are reported to the Public Health Service by State and local health authorities in the United States. For the 10-year period 1932–41, inclusive, 408 milk-borne outbreaks were reported, involving 16,305 cases and 213 deaths (*1*). The diseases included are shown in table 1.

TABLE 1.—*Milk-borne disease outbreaks reported by State and local health authorities as having occurred in the United States during the 10-year period 1932-41, inclusive, by diseases*

Disease	Outbreaks	Cases	Deaths
Typhoid fever	170	1,870	137
Scarlet fever and septic sore throat	100	8,288	69
Food poisoning and gastroenteritis	95	4,160	0
Paratyphoid fever	7	512	0
Undulant fever	12	134	0
Dysentery	10	944	0
Diphtheria	5	64	6
Miscellaneous	9	333	1
Total	408	16,305	213

It should be emphasized that table 1 is a compilation of reported *outbreaks* and that it does not include sporadic cases of typhoid fever, scarlet fever, septic sore throat, etc. It is logical to assume that a portion of these sporadic cases is due to milk. It should also be emphasized that this compilation does not include tuberculosis of bovine origin or infantile diarrhea, nor any significant amount of undulant fever, all of which are largely milk-borne, but which usually occur as sporadic cases rather than in epidemic form. As for undulant fever, it is difficult to estimate the actual incidence and the proportion of the cases and deaths which are milk-borne. For the 10-year period 1932–41, 26,759 cases of undulant fever and 910 deaths from this disease were reported in the United States. The number of such cases and deaths, by years, is given in table 2.

TABLE 2.—*Undulant fever cases and deaths reported in the United States during the 10-year period 1932–41*

Year	Cases	Deaths	Year	Cases	Deaths
1932	1,502	62	1938	4,379	116
1933	1,788	72	1939	3,501	121
1934	2,017	65	1940	3,310	116
1935	2,008	98	1941	3,484	71
1936	2,095	107			
1937	2,675	82	Total	26,759	910

According to the reports of several investigators (*2*) the percentage of undulant fever cases due to milk varies in different localities. In urban areas, where few persons come in contact with livestock or carcasses, the majority of cases are probably due to infected raw milk.

In rural areas, a large proportion of cases may be due to contact with livestock or carcasses. The assumption that one-half of the undulant fever cases and deaths in the United States are due to infected raw milk is believed to be conservative.

Estimates of the economic loss due to death and illness are incomplete measures of the true loss, which includes intangible quantities. Nevertheless, a rough estimate of the economic loss in the United States due to milk-borne disease has been attempted. The money value of a human life is assumed to be $20,000. This is a conservative average value based upon calculations by Dublin and Lotka (*3*) of the present worth of the net future earning capacities of individuals of different ages and different maximum incomes. The cost of a case of disease is influenced by a number of factors and average costs are difficult to estimate. Rough approximations have been made after consulting data given in publications of the Committee on the Costs of Medical Care (*4*, *5*). These costs, which include fees and charges for medical attention, nursing, hospitalization, and laboratory services, range from a total of $10 for gastroenteritis or food poisoning to $265 for typhoid fever and $325 for undulant fever. The money value of working time lost through sickness has also been estimated, assuming the value of one working day to be $6. Thus, the estimates of economic loss include three major factors: (1) the value of a life, (2) the cost of diagnosis and treatment of disease, and (3) the value of working time lost.

Using the estimating method described above, the annual economic loss due to milk-borne disease in human beings has been calculated. The estimated loss for each disease is shown in table 3.

TABLE 3.—*Estimated average annual economic loss from milk-borne disease in the United States, based on reports for the period 1932–41*

Disease	Loss from deaths	Cost of diagnosis and treatment	Value of working time lost	Total economic loss
Typhoid fever	$280,000	$50,000	$67,000	$397,000
Paratyphoid fever		14,000	18,000	32,000
Scarlet fever and septic sore throat	140,000	14,500	40,000	194,500
Diphtheria	20,000	500		20,500
Dysentery		7,000	8,000	15,000
Food poisoning and gastroenteritis		4,000	5,000	9,000
Undulant fever	920,000	435,000	803,000	2,158,000
Total	1,360,000	525,000	941,000	2,826,000

The total estimated annual loss is about $2,800,000. This is an average figure covering the 10-year period 1932–41 and is based upon the data given in tables 1 and 2. The cases and deaths from outbreaks of undulant fever and miscellaneous diseases listed in table 1 were not included in the estimate.

It is desired to emphasize that this estimate of economic loss from milk-borne disease is only a rough approximation. Greater precision would probably not be justified, because of the recognized incompleteness of the reports of both milk-borne disease outbreaks and undulant fever cases. The estimate is believed to be conservative, however, and it can be safely assumed that the actual economic loss is, in round numbers, at least $3,000,000 per year. (It is interesting to note that the annual economic loss due to brucellosis in cattle has been estimated to vary from $30,000,000 to a much higher figure, according to the United States Department of Agriculture, and that due to brucellosis in swine has been estimated as $10,000,000.)

As an illustration of the cost of an outbreak to a specific community, the 1938 outbreak of septic sore throat in an unnamed community of 1,880 inhabitants will be considered briefly. The outbreak consisted of 375 cases with 4 deaths and was caused by raw milk. Using the same unit cost figures as before, it is estimated that the total cost to the community through deaths, cases, and loss of working time was about $100,000. It will be shown later in this paper that it would cost only about $12,000 to provide a pasteurization plant to supply the average demand for pasteurized milk in a community of this size. Without detailed computations, it will at once be apparent that large milk-borne epidemics, such as that of typhoid fever in Montreal, Canada, in 1927, which involved approximately 5,000 cases and 500 deaths, cause a staggering financial loss to the community, and that even small outbreaks are worth preventing.

All milk-borne disease is preventable. In conducting effective milk sanitation programs, health authorities promulgate and enforce ordinances or regulations which quite properly include not one but several measures designed to prevent the transmission of disease by milk. These measures concern the health of the animals and the dairy personnel, the methods of operation, the design of the equipment and buildings, and the water supply and excreta disposal facilities. All these measures have definite value in promoting the cleanliness and safety of milk supplies but are not sufficient to guarantee safety. Examinations of cows and of milk handlers can be done at intervals only, and pathogenic organisms may therefore enter the milk for varying periods before the disease condition is discovered. Unless the milk is also pasteurized, it cannot be guaranteed as safe.

The vast majority of the milk-borne disease outbreaks reported to the Public Health Service are due to raw milk. These reports show that the risk of contracting disease from raw milk is approximately fifty times as great as from pasteurized milk (including milk which was only alleged to be "pasteurized milk") (*6*). That proper pasteurization can and does prevent the transmission of milk-borne disease

has been clearly proved to the satisfaction of health authorities by laboratory and commercial-scale experimental work, by epidemiologic methods, by statistical methods, and by animal experimentation. A classical illustration, and perhaps the most striking example of the immediate effect in the reduction of diarrheal diseases of infants by the pasteurization of milk, is that which occurred in a children's institution on Randall's Island, New York City, where a mortality rate of 44 was promptly reduced to 20 with no hygienic measures put into operation other than the pasteurization of all the milk (*7*). The literature is replete with other examples (*8*), one of the most recent of which is the experience in the Province of Ontario, Canada, during the first year following the adoption of the compulsory pasteurization act. According to Berry (*9*), the cases of undulant fever in 1939 were reduced by about 45 percent, the typhoid fever death rate was lowered about 50 percent, and the infant mortality was substantially reduced in areas under the act. Pasteurization is the most important single protective measure which can be applied to milk. For many years the Public Health Service has advised that all milk should be pasteurized or boiled before consumption. There is no doubt that the present extensive use of pasteurization is preventing a great deal of milk-borne disease.

HISTORY AND EXTENT OF PASTEURIZATION

Although Pasteur did not originate the pasteurization of milk, the process which bears his name was based on his work during the period 1860–70 on the heating of wine and beer to prevent souring. In 1873, Jacobi in New York City advised that milk for infants be boiled in the feeding bottles. He seems to have been the first health expert to advocate that cows' milk be heated (*10*). In 1886, Soxhlet in Germany devised an apparatus for sterilizing milk in baby bottles in the home. Boiling for 40 minutes was advised. In 1893, Nathan Straus, in New York City, opened the first of many infant milk depots for dispensing sterilized milk. During the period 1890–1905 the milk industry developed continuous-flow milk heating equipment. Temperatures ranging from 158° F. to 165° F. were used, with indefinite, if any, holding times and inaccurate controls; this was "flash pasteurization." The prevailing opinion among the medical profession and health officials was that this treatment was an undesirable commercial process intended only to delay spoilage.

In 1906, Rosenau, then Director of the Hygienic Laboratory of the United States Public Health and Marine Hospital Service, determined the thermal death points of milk-borne pathogens, finding that 140° F. for 20 minutes was just sufficient for the destruction of the most heat-resistant one—the tubercle bacillus (*11*). This work and that of

other investigators inspired confidence in such low temperatures for pasteurization and was the foundation for the subsequent general acceptance of the process by health authorities.

The first apparatus for pasteurizing milk by the holding method on a commercial scale in the United States was installed in New York City in 1907 (*10*). The milk was heated to 140° to 150° F. and held for 30 to 45 minutes. The use of pasteurization increased rapidly during the following years. In 1922 the previous work on the thermal death points of milk-borne pathogens was confirmed by the "Endicott experiments," conducted at Endicott, N. Y., by a large group of experts, but numerous engineering defects in commercial pasteurizing apparatus were shown to exist (*10*). Subsequently, intensive studies were made of commercial pasteurizing equipment to determine the defects and to devise corrective measures. In these studies a prominent part was played by the Office of Milk Investigations of the United States Public Health Service, under the late Leslie C. Frank, Senior Sanitary Engineer (*12*). Later studies by the Public Health Service and other health agencies on high-temperature short-time pasteurization led to the acceptance of this method, which is a continuous-flow process distinguished from the old, discredited "flash" method by the accurate and sensitive controls and other safety devices.

As defined in the Milk Ordinance and Code recommended by the Public Health Service (*13*), pasteurization is the heating of *every particle* of milk or milk products to at least 143° F. and holding at this temperature for at least 30 minutes, or to at least 160° F. and holding for at least 15 seconds, in approved and properly operated equipment. The first method is known as the "holding method," and the second as the "high-temperature short-time method."

The use of pasteurized milk expanded rapidly and with the approval of increasing numbers of health officials after the installation of the first holding system in 1907. By 1924, 78.1 percent of the fluid milk sold in communities of more than 10,000 in the United States was pasteurized. For communities over 1,000, the percentage was 68.6. By 1936, the corresponding figures were 83.1 percent and 74.7 percent, respectively, according to a survey of milk control made by the Public Health Service (*14*). Although no more recent data have been collected by the Public Health Service, it is believed that the figures for 1943 would be somewhat greater than those given for 1936, but of the same general magnitude.

A high percentage of the milk supplies of the larger communities in the United States is pasteurized, but most of the milk in the smaller communities is still consumed raw. It is largely in small communities that milk-borne disease outbreaks occur. Table 4 shows, for communities of different sizes, the percentages of milk pasteurized, the

number of pasteurization plants per 1,000 population, and the average daily gallonages sold by the individual plants. All these data are for 1936 (*14*).

TABLE 4.—*Percentage of total market-milk supply protected by pasteurization, number of pasteurization plants per 1,000 population, and total gallons of market-milk sold daily per plant*

Population group	Percent pasteurized	Plants per 1,000 population	Gallons sold daily per plant
1,000–2,499	24.5	0.26	73.1
2,500–4,999	41.1	.29	115.2
5,000–9,999	49.4	.28	150.0
10,000–24,999	58.2	.21	244.8
25,000–99,999	72.6	.20	336.5
100,000–499,999	85.9	.14	587.1
500,000 and over	97.5	.07	1,297.1
Unweighted mean	41.5	.26	
Weighted means:			
1,000–10,000	39.3		
Over 1,000	74.7	.17	309.4
Over 10,000	83.1		

Included in table 4 are many communities in which pasteurized milk was not available locally. Whereas pasteurized milk was available in more than 98 percent of the communities over 10,000, it was available in only 58 percent of those between 1,000 and 10,000. For the smallest population group for which data were obtained—1,000 to 2,499—the corresponding figure was 42 percent, and there is little doubt that the percentage would be considerably smaller for communities of less than 1,000.

These data indicate that there is need for additional pasteurizing facilities in the United States. Although it is probably true that existing plants could expand their delivery zones so as to serve some of the communities not now having pasteurized milk available, a number of new plants would be needed to serve adequately all such areas.

ADDITIONAL PASTEURIZATION PLANTS NEEDED

Before attempting to make a detailed inventory, a number of assumptions were made It was at once concluded that it would be impracticable to proceed on the basis that additional facilities were needed to provide for the pasteurization of the total national market-milk supply which is not now pasteurized. The results would have been of academic interest only. It was decided, instead, to determine the approximate number and sizes of plants needed to serve communities which have no pasteurized milk available. The real objective, from the public health standpoint, is to increase the proportion of the milk supply which is pasteurized. Where pasteurized milk is already available, health authorities are now, or should be, undertak-

ing educational measures to increase its use. These measures and other factors result in a continual increase in the demands for pasteurized milk, and the necessary increases in pasteurizing plant capacity are provided by the industry as a matter of course. Where pasteurized milk is not available, however, it was assumed that plants should be established in all communities or groups of adjacent communities which were large enough to provide reasonable assurance that a plant could operate at a profit.

It was estimated that a pasteurizing plant having an output of 100 gallons of milk daily was the smallest plant which could be expected to operate at a profit. This general assumption seems to be fairly widely accepted, although there are smaller plants in existence which doubtless are considered profitable. Producer-distributors constitute a large proportion of these smaller plants, and will be discussed later. It was next estimated that the smallest community which would support a 100-gallon plant has a population of about 2,000. This was based on data obtained in the 1936 survey of milk control (*14*). According to this survey, the consumption of fluid milk and milk products in communities of 1,000 to 10,000 population (which were considered to be the towns most likely to need the majority of the plants) was approximately 0.65 pint per capita per day, and the average percentage of market milk pasteurized *in the portion of the above communities which had some pasteurized milk sold locally* was 57.8. This figure was increased to 60 percent to allow for a slight increase in pasteurized milk consumption from 1936 to 1943. These figures indicate that the smallest community in which a potential market for at least 100 gallons of pasteurized milk daily would exist has a population of about 2,000.

To determine the number and location of communities needing pasteurization plants, the district offices of the Public Health Service were requested to obtain, from the milk sanitation authorities of each of the States in their district, a list of the communities which need plants, using the above criteria as a guide. Data were received from all States except Iowa, Pennsylvania, and Wyoming. A summary, by States, is given in table 7. For the three States which submitted no data, estimates were prepared by the Public Health Service. Existing pasteurizing plants were spotted on State maps, and all communities or groups of neighboring communities of more than 2,000 population which were more than 25 miles (the estimated maximum practicable delivery distance) from the existing plants were taken as needing plants. Data on the location of existing plants were obtained from a confidential list of dairy products plants furnished by a commercial source, from the list of communities in which the milk ordinance recommended by the Public Health Service is in effect (which lists the percentage of milk pasteurized in each community), and

from the replies of each city to the 1936 questionnaire survey of milk control.

The individual States were asked to include not only the incorporated cities of 2,000 or more which needed plants, but also groups of communities within a radius of approximately 25 miles having a total population of 2,000 or more. They were also asked to indicate the size of plant which, in their opinion, could be supported by each of the communities or groups of communities listed by them as needing plants. These data are tabulated by States in table 8. In general, table 8 represents the State's own estimates of the sizes of plants needed. However, some modifications were made where the State estimates seemed incorrect or were not sufficiently specific. The following notes indicate the listing policies which were generally followed:

1. Several States listed towns of less than 2,000 as needing plants. Plants were not included for any of these towns except (*a*) in Alaska, where certain unusual conditions existed, (*b*) when they could be combined with other small towns within about 25 miles to form a group having a total population of 2,000 or more, and (*c*) in a very few instances when the population was only very slightly less than 2,000.

2. In a few cases, plant sizes were selected partially on the basis of summer populations. In these cases, however, the plant capacity taken was somewhat less than the maximum summer populations would have called for.

3. If the State listed the needed plant as having a capacity of 200 gallons, for example, and did not state whether this was the minimum, average, or maximum capacity, the plant size used for this estimate was determined from the population of the community or group of communities.

ESTIMATED COSTS OF NEEDED PASTEURIZING PLANTS

Pasteurization plant buildings must be specially designed to accommodate the usual operations. The buildings should be of good construction, preferably of masonry, with well-drained floors of concrete or other impervious material, generous lighting and ventilation, and designed specifically for milk plant use so as to provide proper separation of processes and to enable efficient and sanitary operation. The necessary equipment is of special design and includes milk handling equipment, bottle- and can-washing equipment, refrigeration equipment, boiler, etc. It is imperative that buildings and equipment meet high sanitation standards. Such standards are given in the Public Health Service Milk Ordinance and Code *(13)*.

Estimated costs were obtained in two steps. In the first step, plants of four different capacities were assumed, and detailed estimates were made for the following items: real estate, building, equipment,

trucks, garage and dry storage building, initial supplies, and contingencies. Building costs were made by first determining the size of building needed by carefully reviewing 35 individual building plans, and then by applying cubic-foot construction cost figures. The plans reviewed were prepared by the State health departments of North Carolina and Texas, the United States Department of Agriculture (*15*), and the Cherry-Burrell Corporation (*16*). The construction cost figures were based on unit-cost estimates obtained from a number of reliable sources, including the Public Buildings Administration and War Public Works, both in the Federal Works Agency, the architects in the hospital facilities section of the States Relations Division of the Public Health Service, and data in the Engineering News-Record. The unit-cost figures, which ranged from 45 cents to 55 cents per cubic foot, depending upon the building size, are considered adequate to cover the construction costs of well-built masonry pasteurization plants complying with the requirements of the Public Health Service Milk Ordinance and Code. The equipment costs were based on detailed costs for such equipment for plants of different sizes as given in U.S. Department of Agriculture Circular 99 (*17*), with minor modifications to insure compliance with the Public Health Service Milk Ordinance. The cost of trucks was based upon the probable number of delivery routes, and the cost of the garage and dry storage building was based on a structure of sufficient size to house all trucks and to provide adequate dry storage space for supplies. The costs of real estate, initial supplies, and the contingency allowance were not estimated in detail, but reasonable lump sum allowances were made. The resulting total costs were plotted as a function of the capacities of the respective plants, and a smooth curve was drawn through the four points. Table 5 shows the cost breakdown for these four plants. All costs are as of 1942.

TABLE 5.—*Estimated costs of pasteurization plants—breakdown*

Item	Nominal plant capacity in gallons per day			
	100	250-300	500	1,000
Real estate	$500	$1,000	$2,500	$5,000
Building	7,000	10,800	16,800	27,000
Equipment	5,500	7,500	15,000	27,000
Trucks	2,000	4,000	8,000	16,000
Garage	800	1,600	2,900	5,300
Initial supplies	500	750	1,000	2,000
Contingencies	200	350	800	1,700
Total	$16,500	$26,000	$47,000	$84,000

The second step in computing pasteurization plant costs followed the observation that of the four plants referred to above, each one has such a wide (assumed) capacity range that undue inaccuracies in

the total cost would result when plants of these specific sizes were allocated to specific communities. Accordingly, it was decided to provide for nine different sizes of plants instead of four, to cover the same approximate total range of capacity. The costs of these nine plants were estimated graphically from the curve referred to above, and the resulting data are given in table 6. (Attention is called to the fact that the maximum capacity figure shown for each plant is actually the estimated absolute maximum capacity, leaving no room for any further increase in output.)

TABLE 6.—*Estimated costs of pasteurization plants of different sizes*

Plant capacity, gallons per day	Population to be served	Estimated cost	Plant capacity, gallons per day	Population to be served	Estimated cost
100–125	2,000–2,500	$12,000	500–600	10,001–12,000	$43,000
125–200	2,501–4,000	16,500	600–700	12,001–14,000	49,000
200–300	4,001–6,000	23,000	700–800	14,001–16,000	56,000
300–400	6,001–8,000	29,000	800–1,000	16,001–20,000	68,000
400–500	8,001–10,000	36,000			

The detailed data regarding plant cost estimates, comprising about 40 pages, are on file in the office of the Milk and Food Unit of the Sanitation Section. Similarly, the detailed data regarding the specific communities reported as needing plants and the sizes of plants needed are on file in that office.

Table 7 lists by States the number of communities or groups of communities of different sizes in which pasteurizing plants are needed, and their total populations, according to the conditions and assumptions previously mentioned.

TABLE 7.—*Number of communities or groups of communities of specified sizes in which pasteurization plants are needed*

State	Population range								Total	
	2,000–2,500	2,501–4,000	4,001–6,000	6,001–8,000	8,001–10,000	10,001–12,000	12,001–14,000	14,001–20,000	Number	Population
Alabama	2	9	9	5	0	0	0	0	25	110,011
Arizona	0	0	0	0	0	0	0	0	0	0
Arkansas	0	0	2	4	0	1	2	0	9	74,377
California	0	1	0	0	0	0	0	0	1	3,235
Colorado	1	6	2	0	0	0	0	0	9	31,221
Connecticut	4	0	0	0	0	0	0	0	4	9,450
Delaware	0	0	0	0	0	0	0	0	0	0
Florida	5	4	0	0	0	0	0	0	9	22,849
Georgia	7	18	11	6	1	1	1	0	45	203,200
Idaho	3	5	2	0	0	0	1	0	11	44,470
Illinois	8	11	2	1	0	0	0	0	22	65,284
Indiana	0	0	0	0	0	0	0	0	0	0
Iowa	2	1	0	0	0	0	0	0	3	7,811
Kansas	6	2	0	0	0	0	0	0	8	20,311
Kentucky	1	7	2	4	0	0	0	0	14	61,778
Louisiana	3	4	4	0	0	0	0	0	11	38,655
Maine	0	0	0	1	0	0	0	0	1	7,800
Maryland	0	0	0	0	0	0	0	0	0	0
Massachusetts	0	0	0	0	0	0	0	0	0	0
Michigan	0	0	0	0	0	0	0	0	0	0
Minnesota	5	7	4	0	0	0	0	0	16	49,714
Mississippi	5	5	6	2	0	1	0	0	19	82,462
Missouri	0	0	0	0	0	0	0	0	0	0

TABLE 7.—*Number of communities or groups of communities of specified sizes in which pasteurization plants are needed*—Continued

State	Population range								Total	
	2,000–2,500	2,501–4,000	4,001–6,000	6,001–8,000	8,001–10,000	10,001–12,000	12,001–14,000	14,001–20,000	Number	Population
Montana	4	5	0	0	0	0	0	0	9	24,770
Nebraska	4	10	6	1	0	0	0	0	21	73,717
Nevada	2	0	0	0	0	0	0	0	2	4,409
New Hampshire	1	3	3	0	0	0	0	0	7	25,718
New Jersey	0	0	0	0	0	0	0	0	0	0
New Mexico	3	3	0	0	0	0	0	0	6	15,616
New York	0	0	0	0	0	0	0	0	0	0
North Carolina	6	5	5	2	0	2	0	1	21	105,476
North Dakota	4	8	0	0	0	0	0	0	12	33,207
Ohio	0	0	0	0	0	0	0	0	0	0
Oklahoma	5	12	3	2	0	0	0	0	22	74,416
Oregon	0	0	0	0	0	0	0	0	0	0
Pennsylvania	0	2	1	0	0	0	0	0	3	11,948
Rhode Island	0	0	0	0	0	0	0	0	0	0
South Carolina	0	2	5	3	1	0	0	0	11	60,025
South Dakota	7	2	3	0	0	0	0	0	12	36,857
Tennessee	4	11	5	3	0	0	0	0	23	87,353
Texas	14	22	3	4	1	1	2	0	47	183,836
Utah	0	0	1	0	0	0	1	0	2	17,235
Vermont	0	0	0	0	0	0	0	0	0	0
Virginia	0	0	0	0	0	0	0	0	0	0
Washington	3	4	3	1	0	0	0	0	11	43,006
West Virginia	1	4	0	2	1	0	0	0	8	37,681
Wisconsin	5	2	0	0	0	0	0	0	7	16,512
Wyoming	3	1	0	0	0	0	0	0	4	10,162
Alaska	3	0	0	0	0	0	0	0	3	4,635
Hawaii	0	0	0	0	0	0	0	0	0	0
Total:										
Communities	121	176	82	41	4	6	7	1	438	....
Populations	265,372	551,105	399,840	279,316	35,095	63,527	88,541	16,411	....	1,699,207

Table 8 lists by States the number of plants needed and their estimated total costs, according to the conditions and assumptions previously discussed.

TABLE 8.—*Number of pasteurization plants of specified sizes needed*

State	Plant capacity (gallons per day)								Total	
	100–125	126–200	201–300	301–400	401–500	501–600	601–700	701–1,000	Number of plants	Estimated cost
Alabama	2	17	6	0	0	0	0	0	25	$442,500
Arizona	0	0	0	0	0	0	0	0	0	0
Arkansas	0	0	2	4	0	2	1	0	9	297,000
California	0	1	0	0	0	0	0	0	1	16,500
Colorado	1	8	0	0	0	0	0	0	9	144,000
Connecticut	4	0	0	0	0	0	0	0	4	48,000
Delaware	0	0	0	0	0	0	0	0	0	0
Florida	5	4	0	0	0	0	0	0	9	126,000
Georgia	9	16	12	6	1	0	1	0	45	907,000
Idaho	4	4	2	1	0	0	0	0	11	189,000
Illinois	10	10	2	0	0	0	0	0	22	331,000
Indiana	0	0	0	0	0	0	0	0	0	0
Iowa	2	1	0	0	0	0	0	0	3	40,500
Kansas	0	6	2	0	0	0	0	0	8	145,000
Kentucky	1	6	3	2	2	0	0	0	14	310,000
Louisiana	7	2	2	0	0	0	0	0	11	168,000
Maine	0	0	0	1	0	0	0	0	1	29,000
Maryland	0	0	0	0	0	0	0	0	0	0
Massachusetts	0	0	0	0	0	0	0	0	0	0
Michigan	0	0	0	0	0	0	0	0	0	0
Minnesota	5	7	4	0	0	0	0	0	16	267,500
Mississippi	7	6	3	2	1	0	0	0	19	346,000
Missouri	0	0	0	0	0	0	0	0	0	0
Montana	0	5	4	0	0	0	0	0	9	174,500
Nebraska	1	10	9	1	0	0	0	0	21	412,000

TABLE 8.—*Number of pasteurization plants of specified sizes needed*—Continued

State	Plant capacity (gallons per day)								Total	
	100-125	126-200	201-300	301-400	401-500	501-600	601-700	701-1,000	Number of plants	Estimated cost
Nevada	1	1	0	0	0	0	0	0	2	$28,500
New Hampshire	4	1	2	0	0	0	0	0	7	110,500
New Jersey	0	0	0	0	0	0	0	0	0	0
New Mexico	3	3	0	0	0	0	0	0	6	85,500
New York	0	0	0	0	0	0	0	0	0	0
North Carolina	6	5	5	2	0	2	0	1	21	481,500
North Dakota	4	8	0	0	0	0	0	0	12	180,000
Ohio	0	0	0	0	0	0	0	0	0	0
Oklahoma	5	12	3	2	0	0	0	0	22	385,000
Oregon	0	0	0	0	0	0	0	0	0	0
Pennsylvania	0	2	1	0	0	0	0	0	3	56,000
Rhode Island	0	0	0	0	0	0	0	0	0	0
South Carolina	0	2	5	3	1	0	0	0	11	271,000
South Dakota	7	2	3	0	0	0	0	0	12	186,000
Tennessee	4	11	5	3	0	0	0	0	23	431,500
Texas	14	22	3	4	1	1	2	0	47	893,000
Utah	0	0	1	0	0	0	1	0	2	72,000
Vermont	0	0	0	0	0	0	0	0	0	0
Virginia	0	0	0	0	0	0	0	0	0	0
Washington	3	4	3	1	0	0	0	0	11	200,000
West Virginia	1	4	0	2	1	0	0	0	8	172,000
Wisconsin	5	2	0	0	0	0	0	0	7	93,000
Wyoming	3	1	0	0	0	0	0	0	4	52,500
Alaska	3	0	0	0	0	0	0	0	3	36,000
Hawaii	0	0	0	0	0	0	0	0	0	0
Total:										
Plants	121	183	82	34	7	5	5	1	438	
Cost..dols	1,452,000	3,019,500	1,886,000	986,000	252,000	215,000	245,000	68,000		8,123,500

The above data indicate that 438 plants are needed in 34 States and Alaska. The estimated total cost is $8,123,500. No plants were reported as needed by 14 States. The total population of the 438 communities or groups of communities needing plants is 1,699,207. The average cost of the 438 plants is $18,547 per plant. For the States needing plants, the smallest number needed is 1, for Maine and California; the greatest number of plants needed by any State (Texas) is 47.

For States needing plants, the lowest cost per State is $16,500, for California; the average cost per State (including Alaska) is $232,100; and the highest cost is $907,000, for Georgia. For States needing plants, the total population of the communities or groups of communities needing plants ranges from 3,235 in California to 203,200 in Georgia. The average per State is 48,549.

DISCUSSION

It should be emphasized that certain of the assumptions which have been made in preparing this inventory should not be interpreted as being recommended limitations of pasteurization plant needs. For example, no estimate of the costs of installing pasteurization plants at existing producer-distributor dairies has been attempted. This omission is due to the fact that it was considered impossible to arrive at satisfactory average cost figures for such installations and to predict

what proportion of the needed plants might be expected to fall in this category. Such plants would usually cost considerably less than the figures given in these estimates, because of reduced total and unit building costs, and because certain equipment as well as delivery trucks and storage and garage space would already be provided. Many of the plants that might be provided to fill the needs shown in this inventory would of course be "farm plants."

It should be emphasized again that this estimate of pasteurization plant needs has not been made on the basis of attempting immediate pasteurization of all the market milk in the United States. Instead, the basis has been the sounder approach of estimating the cost of making pasteurized milk *available* to all communities where it is economically feasible to do so under present conditions, and of recognizing that the pasteurization of all milk sold in these communities is a goal which can only be reached after a period of education.

It must also be recognized that this estimate does not adequately take into account the smaller communities (in general, those towns or groups of towns with populations of less than 2,000) in which the potential market is not thought adequate to enable the smallest plant used in this inventory to operate at a profit. Of course, many such communities would be within reasonable delivery distance of existing or proposed plants. Although many such communities can be served by small plants, such as small producer-distributor plants, the eventual solution to the problem apparently must await the development of more inexpensive pasteurizing equipment of a type which is practical and acceptable to health authorities In the meantime, consumers who can obtain only raw milk should purchase a high-grade raw milk and should pasteurize it at home in the following simple manner: Place the milk in a vessel over a hot flame and heat to 165° F., stirring constantly; then immediately set the vessel in cold water and continue stirring until cool.

In this article it is not intended to imply that the sole milk sanitation need of the United States is the provision of additional pasteurizing plants.

Obviously, the principal benefit would be to the public health through a reduction in the number of cases and deaths due to milk-borne disease. It would cost only about $8,000,000 to provide the pasteurization plants allowed for in this estimate While this would not prevent the occurrence of milk-borne disease completely, as has been explained above, it should aid materially in reducing the amount of such disease, which has cost at least $3,000,000 annually for the years 1932–41. Other benefits may be anticipated, however, including those accruing to dairy farmers through higher returns for the sale of milk due to sales increases resulting from greater consumer confidence in the safety of the milk supply.

POSSIBLE METHODS OF MEETING THE NEEDS

It is beyond the scope of this paper to attempt more than a brief consideration of the possible methods of satisfying the needs outlined herein. Based upon the experience of the past, it is logical to predict that in many cases the needed plants will be established by local dairymen or others who perceive the existence of a sound business opportunity. Such action is being encouraged by the increasing demands of consumers for pasteurized milk. The construction of many plants has probably been delayed during the war period because pasteurization equipment utilizes critical materials needed for more important war uses. However, there will undoubtedly be many cases in which persons will be unwilling or unable to establish plants because of the initial cost and the financial risk involved. Therefore, it may be wise to consider the advisability of providing Federal financial assistance to responsible individuals, firms, or cooperatives for this purpose. Apparently there are ample precedents for the use of Federal funds to finance the construction of milk pasteurization plants. One precedent is the use of Federal funds to finance plants for the manufacture of war materials. Another precedent is the use of Federal funds to insure loans made by local banks to finance home construction or remodeling under the Federal Housing Administration program. In the first case the justification was the importance to the national defense and the prosecution of the war; in the second case the justification was the need of stimulating the construction industry and the desirability of providing improved housing. In the case of milk pasteurization plants the justification is the increased safety of the milk supply.

It would seem that the most desirable method of financing might consist of Federal insurance of loans made by local banks by a method such as that used by the Federal Housing Administration. This method would seem to promote the maximum amount of construction with the minimum amount of Federal funds and would permit the maximum amount of local initiative and control with the minimum of Federal restrictions. However, as stated above, the purpose of this article is to point to a need rather than to develop a suggested comprehensive program of action. It will be sufficient to point out that the construction of pasteurization plants could readily be included in any public works program which might be initiated to alleviate ecomomic depression during the post-war period.

Grateful acknowledgment is made of the assistance of the following persons: Passed Assistant Surgeon (R) Burnet M. Davis, for estimating the total cost of medical and other services and the working time lost per case of disease; Assistant Sanitarians (R) Harold Wainess and Clarence Moss for assembling and interpreting the data on localities needing plants; and the various persons in Public Health Service

district offices and State health departments, or other State milk sanitation agencies, who so courteously cooperated in furnishing the basic data.

REFERENCES

(1) Milk-borne Disease Outbreaks Reported by State and Local Health Authorities as Having Occurred in the United States. Annual mimeographed reports, U. S. Public Health Service.

(2) a. Beyer, M. R.: Undulant fever. J. Okla. State Med. Assoc., **30**: 50 (February 1937).
b. Huddleson, I. F.: Brucellosis in Man and Animals. The Commonwealth Fund, New York, 1939.
c. Welch, Howard: Bang's Disease. Circular 152, Montana Agr. Exp. Station (May 1938). P. 10.
d. Swartout, H. O.: Typewritten report to Dr. Pomeroy, Los Angeles County Health Officer (June 1938).
e. Simpson, W. M.: Undulant Fever. U. S. Naval Medical Bulletin (October 1931). P. 583.
f. Gilbert, Ruth: Undulant fever in New York State. J. Infec. Dis., (May-June 1934). P. 305.
g. Starr, L. E., and Maxcy, K. F.: Undulant fever and its relation to brucella infection in cattle and swine in Virginia. Virginia Med. Monthly, **60**: 218 (July 1933).
h. Hardy, A. V., et al.: Undulant Fever. National Institute of Health Bulletin No. 158 (1931). P. 42.
i. Hasseltine, H. E.: Recent progress in studies of undulant fever. Pub. Health Rep., **45**: (July 18, 1930).

(3) Dublin, L. I., and Lotka, A. J.: The Money Value of a Man. Ronald Press Co., N. Y., 1930.

(4) Falk, I. S., Klem, M. C., and Sinai, N.: The Incidence of Illness and the Receipt and Costs of Medical Care Among Representative Families. Committee on the Costs of Medical Care Publication No. 26. University of Chicago Press, 1933.

(5) Lee, R. I., and Jones, L. W.: The Fundamentals of Good Medical Care. Committee on the Costs of Medical Care Publication No. 22. University of Chicago Press, 1933.

(6) Fuchs, A. W.: Disease outbreaks from water, milk, and other foods in 1939. Pub. Health Rep., **56**: 2277–2284. (Nov. 28, 1941).

(7) Report of the Committee on Milk Production and Control, White House Conference on Child Health and Protection. Century Co., N. Y., 1932. P. 13.

(8) Fuchs, A. W.: Milk and Its Relation to Disease. Mimeographed, U. S. Public Health Service, 1940.

(9) Berry, A. E.: Progress in pasteurization in Ontario. Canad. J. Pub. Health, **32**: 208–212 (April 1941).

(10) North, C. E., et al. Commercial Pasteurization. Public Health Bulletin No. 147 (1925).

(11) Rosenau, M. J.: The Thermal Death Points of Pathogenic Microorganisms in Milk. Hygienic Laboratory Bulletin No. 42 (1908).

(12) Moss, F. J.: Milk investigations of the U. S. Public Health Service. J. Milk Tech., **3**: 145–154 (May-June 1940).

(13) Milk Ordinance and Code Recommended by the United States Public Health Service, 1939. Public Health Bulletin No. 220.

(14) Fuchs, A. W., and Frank, L. C.: Milk Supplies and Their Control in American Urban Communities of Over 1,000 Population in 1936. Public Health Bulletin No. 245 (1939).

(15) Grant, F. M., and Clement, C. E.: Small Plants for Pasteurizing Milk. U. S. Department of Agriculture Circular No. 214 (March 1932).

(16) Practical Plans for Modern Dairies. Bulletin G–375 (August 1940). The Cherry-Burrell Corporation, Chicago, Ill. Also see Bulletin G–408 (February 1942), a revised edition.

(17) Clement, C. E., Bain, J. B., and Grant, F. M.: Equipment for City Milk Plants. U. S. Department of Agriculture Circular No. 99 (December 1929, revised June 1941).

HEALTH OF STUDENT NURSES

Report of a Study Conducted in a School of Nursing

By LEONHARD FELIX FULD, Ph. D., *Health Director, Medical Center School of Nursing, Jersey City, N. J.*

THE HEALTH PROGRAM

During the past 20 years, under the sponsorship of Dr. George O'Hanlon, medical director of the Medical Center School of Nursing, the writer has been engaged in the planning and administration of a comprehensive health program for the student nurses in the Medical Center School of Nursing in Jersey City, N. J. The period covered by this report is from July 1942 to June 1943, inclusive. The average number of student nurses in the school during the year was 300, exclusive of students affiliating from other schools and students who are candidates for an academic degree and not presently resident in the School of Nursing.

Each applicant for admission is given a preadmission health audit, 3 months before her entrance, by 15 senior members of the attending staff of the hospital, each physician confining himself to the field of his specialty. The results of this audit are explained to each applicant and her mother by the health director at an individual preadmission health counsel conference lasting 30 minutes. The correction of every remediable health defect is a condition precedent to acceptance in the school.

Each student is protected against tuberculosis by means of a semiannual tuberculin test until her reaction becomes positive, and by means of quarterly chest roentgenograms. Also, each student is given, during her preclinical period, active immunization against smallpox, diphtheria, typhoid fever, and scarlet fever by means of an increased number of attenuated doses, which obviates the reactions formerly considered a serious objection to the immunization of student nurses.

Throughout the 3-year course, seminar instruction in immunization, personal hygiene, community hygiene, industrial hygiene, and emergencies is given to the students by the health director. Painstaking and sympathetic convalescent health counsel is given to every student who has been hospitalized. The accompanying statistical tables have been compiled from the results of this convalescent health counsel.

As an incentive to the students in the field of personal health, a gold award is offered at graduation and health honor certificates bearing the signature of the medical director are bestowed at regular intervals during the 3-year course. The health program is dynamic and not

static, and the results attained are checked by adequate statistical control.

Credit for such measure of success as this program has attained is given to the farsighted administrative vision and tactical executive ability of Dr. George O'Hanlon, medical director.

SUMMARY OF FINDINGS

The findings disclosed by the accompanying statistical tables which are of greatest interest and practical value to those who are professionally interested in the health of student nurses may be summarized as follows:

Most student illness occurred during the winter months (table 1).

Most student illness was caused by respiratory diseases (table 2).

Cases of illness requiring only 1 day of hospitalization constituted the largest group (table 3).

Most student illness was attributable to causative factors lying in the field of hospital and nursing school administration (table 4).

Students requiring only one hospitalization constituted the largest group (table 5).

There is no significant difference in the incidence of illness in the various classes of the school (table 6).

While 20 percent of the student body in the classroom had only 8 percent of the total days of disability, 11 percent on surgical assignment had 21 percent of the total days of disability (table 7).

TABLE 1.—*Illness distribution by months*

Month	Number cases [1]	Percent	Number cases per 1,000 students	Number days disabled [2]	Percent	Number days disabled per 1,000 students
1942						
July	20	6	66	147	7	490
August	12	4	40	101	5	336
September	20	6	66	134	6	446
October	24	7	80	139	7	463
November	27	9	90	214	10	713
December	30	10	100	161	7	536
1943						
January	40	13	133	242	11	806
February	18	5	60	131	6	436
March	49	15	163	303	14	1,010
April	29	9	96	244	11	813
May	25	8	83	184	8	613
June	27	8	90	173	8	577
Total	321	100	1,070	[3] 2,173	100	7,243

[1] A case of illness is the loss of one-half day or more from duty by reason of illness or accident.

[2] Days disabled are days lost from duty by reason of hospitalization for personal illness or subsequent convalescent leave.

[3] Days disabled are the total days lost on account of cases having their onset in the calendar month.

(These definitions apply to all the tables.)

TABLE 2.—*Diagnoses*

Diagnoses	Number cases	Percent	Number cases per 1,000 students	Number days disabled	Percent	Number days disabled per 1,000 students
Burns	8	2	27	52	2	173
Cerebral	1	.3	3	15	1	50
Contagion	22	7	73	271	12	904
Dental	4	1	13	13	1	43
Dermatology	48	15	160	266	13	887
Ears	1	.3	3	1	.5	3
Eyes	6	2	20	37	1	123
Gastro-intestinal	45	14	150	227	11	757
Gynecology	13	4	44	110	4	367
Heat	1	.3	3	8	.5	36
Orthopedic	9	3	30	87	4	290
Respiratory	151	47	504	1,036	48	3,453
Ill-defined	12	4	40	50	2	167
Total	321	100	1,070	2,173	100	7,243

TABLE 3.—*Duration of illness*

Number days	Number cases	Percent	Number cases per 1,000 students	Number days disabled	Percent	Number days disabled per 1,000 students
0	2	6	7	0	0	0
1	48	15 0	160	48	2	160
2	31	9 6	103	62	3	207
3	35	11 6	117	105	5	350
4	34	10 3	113	136	6	453
5	24	7.6	80	120	6	400
6	33	10 0	110	198	9	660
7	13	4 0	43	91	4	303
8	13	4.0	43	104	5	347
9	12	3 6	40	108	5	360
10	10	3.0	33	100	5	333
11	10	3 0	33	110	5	367
12	6	2.0	20	72	3	240
13	10	3 0	33	130	6	433
14	6	2 0	20	84	4	280
15	4	1.3	13	60	3	200
16	4	1.3	13	64	3	213
17	4	1.3	13	68	3	227
18	4	1.3	13	72	3	240
20	5	1.6	17	100	5	334
21	2	.6	7	42	2	140
23	2	.6	7	46	2	154
24	1	.3	3	24	1	80
25	2	.6	7	50	2	167
27	1	.3	3	27	1	90
28	2	.6	7	56	2	187
29	1	.3	3	29	1	97
31	1	.3	3	31	2	104
35	1	.3	3	35	2	117
Total	321	100.0	1,070	2,173	100	7,243

TABLE 4.—*Health faults*

Health faults	Number cases	Percent	Number cases per 1,000 students	Number days disabled	Percent	Number days disabled per 1,000 students
Administration	144	45	480	1,105	51	3,684
Delay	51	16	170	255	11	850
Hygiene	55	17	184	310	14	1,033
None	50	15	166	341	16	1,136
Safety	21	7	70	162	8	540
Total	321	100	1,070	2,173	100	7,243

TABLE 5.—*Repetitious hospitalization*

Hospitalizations	Number students	Cases	Percent	Number cases per 1,000 students	Number days disabled	Percent	Number days disabled per 1,000 students
1	110	110	34	367	666	31	2,220
2	62	124	39	413	825	40	2,750
3	11	33	10	110	237	11	790
4	9	36	11	120	248	12	827
5	2	10	3	33	106	5	353
8	1	8	3	27	91	1	303
Total	195	321	100	1,070	2,173	100	7,243

TABLE 6.—*Classes*

Classes	Cases	Percent	Number cases per 1,000 students	Number days disabled	Percent	Number days disabled per 1,000 students	Number student nurses in class
1941	1	1		11	1		
1942	14	4		129	6		
1943	41	13		231	12		
1944	82	26	1,171	620	28	8,857	70
1945	121	37	1,476	742	34	9,049	82
1946	19	6	594	98	4	3,064	32
5-year [1]	43	13	693	342	15	5,532	62
Total	321	100		2,173	100		

[1] 5-year students who spend the first 2 years of their residence at the New Jersey State College for Teachers and the following 3 years of residence at the Medical Center School of Nursing are candidates for an academic degree.

TABLE 7.—*Assignments*

Assignments	Number cases	Percent	Number days disabled	Percent	Number student nurses assigned	Percent
Class room	38	12	169	8	48	20.0
Diet kitchen	6	1	33	1	6	3.0
Ear, nose, throat	2	1	7	.5	2	1.0
Emergency	1	1	11	.5	1	.5
Gynecology	11	3	129	6	3	1.5
Infirmary	2	1	12	.5	1	.5
Isolation	27	8	134	6	14	5.5
Malignancy	7	2	63	3	4	2.0
Medical	58	18	459	21	26	10.0
Night duty	16	5	111	5	33	13.0
Obstetrics	12	4	43	2	21	9.0
Operating room	22	7	157	7	14	6.0
Orthopedics	19	6	148	7	6	3.0
Out-patient	4	1	21	1	6	3.0
Pediatrics	22	7	148	7	18	7.0
Psychiatry	3	1	5	.5	3	1.5
Public health	3	1	25	1	1	.5
Surgical	60	19	448	21	27	11.0
Teaching	2	1	15	1	1	.5
Urology	6	1	35	1	3	1.5
Total	321	100	2,173	100	288	100.0

MORTALITY IN LARGE CITIES, 1943

A total of 483,599 deaths occurred in a group of 90 large cities in the United States during 1943, as compared with 443,962 deaths in 1942, according to provisional figures recently issued by the Bureau of the Census. This represents an increase of 8.9 percent, as compared with an increase of 1.4 percent in 1942. The largest percentage increases were reported in the East South Central and Middle Atlantic areas, and the smallest in the Pacific and South Atlantic areas.

The number of deaths reported for each week in these cities during 1943 exceeded the average for the corresponding weeks of the 3 preceding years except for 2 weeks in July. A major increase was recorded during the influenza epidemic, beginning with the week ended December 4 and continuing to the end of the year. Both the influenza epidemic during December and the increase in the population of this group of cities contributed to the total increase. Deaths during the last 5 weeks of 1943 in excess of the number reported for the corresponding weeks of 1942 account for more than a quarter and the population growth for about one-tenth of the total increase, leaving 5.5 percent attributable to other factors.

An increase was also reported in the number of infant deaths and in the infant death rate recorded for these cities. The number of infant deaths during 1943 was 10.1 percent greater than the total for 1942, and the provisional infant mortality rate of 35.6 per 1,000 estimated live births was 3.2 percent higher than the provisional rate of 34.5 for 1942.

A rise in total mortality was also reported in a group of 42 States during the first 11 months of 1943, the death rate for this period being 3.9 percent higher than that for the same months of 1942. It is interesting to note that increase in the infant mortality rate for the group of large cities is contrary to the experience of a larger reporting area. The provisional infant mortality rate for 40 States for the first 11 months of 1943 was 8.6 percent lower than that for the corresponding period of 1942.

These provisional mortality figures are from tabulations made on the basis of the place of occurrence, and not by place of incidence. The figures for each city, therefore, include deaths of nonresidents dying in the city, and exclude deaths of residents occurring elsewhere.

	Provisional		Final
	1943	1942	1942
Total deaths, 90 cities	483,599	443,962	449,306
Percentage increase over preceding year's total	8.9	1.4	
Deaths under 1 year of age	33,830	30,737	
Deaths under 1 year of age per 1,000 estimated live births	33.6	34.5	
Percentage increase over preceding year's rate per 1,000 live births	3.2		

COURT DECISION ON PUBLIC HEALTH

Venereal disease quarantine upheld.—(Florida Supreme Court, Division B; *Varholy* v. *Sweat, Sheriff*, 15 So.2d 267; decided October 8, 1943.) A habeas corpus proceeding was brought to secure the petitioner's release from detention under a quarantine order entered by a deputy health officer on the ground that the petitioner had a communicable venereal disease. The petitioner alleged that she was confined in the county jail charged with being drunk and disorderly, that at the hearing before the justice of the peace no evidence was produced showing proper ground to hold her to answer such charge, and that the justice had set her appearance bond in the amount of $500, which amount was excessive. The respondent sheriff filed his return to the writ showing that he was holding the petitioner by virtue of a commitment and an order of quarantine by the health officer. At the hearing the trial judge stated that he would first consider the reasonableness and justness of the quarantine and would later consider the excessiveness of bail on the criminal charge. The health officer testified, among other things, that the petitioner had voluntarily submitted to an examination; that the laboratory reports showed that she had a venereal disease; that the purpose of the quarantine was to remove the infected individual from society for treatment; and that the petitioner, while confined in the county jail, was quarantined therein pending transfer to one of the quarantine hospitals operated by the State board of health for the isolation and treatment of venereally infected persons. There was no testimony of immoral habits on the part of the petitioner. The trial court entered an order to the effect that the evidence showed that the petitioner was infected with gonorrhea, that she had been duly quarantined by the deputy health officer for the duration of such disease, and that said quarantine was reasonable and proper. Accordingly he denied the petition and ordered that the petitioner remain under quarantine for treatment until cured and that upon cure he would then consider the application to reduce the bond under the minor criminal charge.

The petitioner appealed to the Supreme Court of Florida but that court concluded that the action of the lower court was justified by the evidence and affirmed the order appealed from. In its opinion the appellate court pointed out that a section of the State statutes relating to the examination and treatment for venereal diseases of persons confined in any State, county, or city prison was applicable under the evidence and justified the order of the trial court. There was also cited another section which vested the State board of health with authority to make regulations concerning the isolation and treatment of venereally infected persons and the court went on to say that the board had adopted regulations, one of which authorized the health

officer to quarantine infected persons either on the premises where they lived, or in any other place, hospital, or institution in the jurisdiction that may have been provided, and, if no such place had been provided, confinement in the county or city jail under quarantine could be resorted to.

The appellate court took occasion to state that it had recently denied, without opinion, an application for the release of the petitioner on an appearance bond pending disposition of the appeal in the instant case. We might well, said the court, now state our reasons for denying such application. "Our view was that plaintiff-in-error was being held under a quarantine order, which is not a criminal proceeding, and hence not bailable. As soon as plaintiff-in-error is cured and released from quarantine, the court below has very properly announced that she will be promptly released from custody on a nominal bail bond to appear and answer the minor criminal charge for which she was arrested." The court concluded by saying that to grant release on bail to persons isolated and detained on a quarantine order because they have a contagious disease which makes them dangerous to others, or to the public in general, would render quarantine laws and regulations nugatory and of no avail.

DEATHS DURING WEEK ENDED JANUARY 29, 1944

[From the Weekly Mortality Index, issued by the Bureau of the Census, Department of Commerce]

	Week ended Jan. 29, 1944	Corresponding week, 1943
Data for 90 large cities of the United States:		
Total deaths	9,954	10,181
Average for 3 prior years	9,786	
Total deaths, first 4 weeks of year	45,173	41,264
Deaths under 1 year of age	626	732
Average for 3 prior years	622	
Deaths under 1 year of age, first 4 weeks of year	2,575	2,984
Data from industrial insurance companies:		
Policies in force	66,242,194	65,305,721
Number of death claims	15,316	13,805
Death claims per 1,000 policies in force, annual rate	12.1	11.0
Death claims per 1,000 policies, first 4 weeks of year, annual rate	12.3	11.2

PREVALENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED FEBRUARY 5, 1944

Summary

The incidence of meningococcus meningitis increased during the week. A total of 571 cases was reported, as compared with 527 for the preceding week, a 5-year (1939–43) median of 60, and 330 for the corresponding week last year, which was the largest number reported for the corresponding week of any prior year. For the current week, 326 cases, or 57 percent of the total, were reported in the Middle Atlantic, East North Central, and South Atlantic areas. An aggregate of 318 cases, or 56 percent of the total, was reported in 9 States, as follows (last week's figures in parentheses): *Increases*—New York 64 (56), Ohio 29 (24), Illinois 29 (16), Michigan 31 (29), Virginia 27 (15), Texas 29 (28), California 49 (39); *decreases*—Pennsylvania 35 (41), Missouri 25 (34). No other State reported more than 17 cases. The cumulative total for the first 5 weeks of the year is 2,845, as compared with 1,612 for the same period last year and a 5-year median of 275.

A further decrease in the incidence of influenza was recorded, a total of 14,912 cases being reported, as compared with 22,843 last week, and a 5-year median of 5,667. Of the total for the current week, 10,649 cases, or 71 percent, were reported in the South Atlantic and West South Central States.

The incidence of scarlet fever and measles increased slightly during the current week to 5,365 and 18,648 cases, respectively, as compared with 4,936 and 15,403 for the preceding week. The cumulative figures for the first 5 weeks of the year for these diseases are, respectively, 23 and 38 percent higher than the corresponding 5-year median figures.

A total of 131 cases of typhoid fever was reported, 70 of which occurred in Indiana. An outbreak has been reported in the north central area of the State. Of 384 cases reported to date for the country as a whole, 117 cases occurred in Indiana.

Both current and cumulative figures for diphtheria, poliomyelitis, smallpox, and whooping cough continue below the respective 5-year medians.

Deaths in 89 large cities of the United States totaled 9,455, as compared with 9,937 last week and a 3-year (1941–43) average of 9,736. The total to date is 54,497, as compared with 51,182 for the same period last year.

Telegraphic morbidity reports from State health officers for the week ended February 5, 1944, and comparison with corresponding week of 1943 and 5-year median

In these tables a zero indicates a definite report, while leaders imply that, although none was reported, cases may have occurred.

Division and State	Diphtheria			Influenza			Measles			Meningitis, meningococcus		
	Week ended—		Median 1939–43	Week ended—		Median 1939–43	Week ended—		Median 1939–43	Week ended—		Median 1939–43
	Feb. 5, 1944	Feb. 6, 1943		Feb. 5, 1944	Feb. 6, 1943		Feb. 5, 1944	Feb. 6, 1943		Feb. 5, 1944	Feb. 6, 1943	
NEW ENGLAND												
Maine	0	1	1	26	------	4	283	12	69	4	11	0
New Hampshire	0	0	0	20	------	------	0	23	16	0	1	1
Vermont	0	0	0	51	------	------	97	308	12	1	0	0
Massachusetts	2	5	4	------	------	------	351	572	462	17	6	1
Rhode Island	0	5	0	25	------	------	275	20	20	4	23	0
Connecticut	1	1	1	8	17	8	155	506	170	10	1	1
MIDDLE ATLANTIC												
New York	9	7	16	[1] 12	[1] 12	[1] 19	1,244	1,205	908	64	39	7
New Jersey	2	1	8	83	18	42	1,029	726	165	17	12	8
Pennsylvania	6	10	11	8	2	------	1,757	2,846	1,553	35	16	5
EAST NORTH CENTRAL												
Ohio	0	13	17	61	14	14	1,641	136	136	29	11	2
Indiana	16	7	16	35	8	40	345	321	78	13	6	1
Illinois	21	10	19	54	14	36	716	371	171	29	8	1
Michigan [2]	8	8	8	15	35	21	1,297	166	183	31	5	1
Wisconsin	0	6	0	245	84	68	1,320	641	554	12	8	0
WEST NORTH CENTRAL												
Minnesota	6	5	3	2	2	2	1,011	21	380	4	4	0
Iowa	4	1	4	37	------	7	386	75	103	1	1	0
Missouri	0	8	7	27	3	22	141	147	81	25	18	1
North Dakota	0	0	3	12	28	28	291	7	13	3	1	0
South Dakota	1	0	0	4	2	2	137	136	37	1	2	0
Nebraska	2	4	1	102	38	------	29	95	45	3	2	1
Kansas	6	6	5	82	11	14	258	348	278	6	4	0
SOUTH ATLANTIC												
Delaware	2	0	0	------	------	------	18	3	3	1	0	0
Maryland [2]	1	4	4	115	17	61	467	19	25	14	14	0
District of Columbia	0	2	2	9	2	5	39	30	18	5	2	0
Virginia	11	12	12	1,733	660	1,100	669	201	140	27	18	3
West Virginia	4	5	5	464	23	27	331	5	20	6	2	2
North Carolina	11	14	16	78	35	80	978	56	152	16	10	1
South Carolina	3	4	6	1,811	659	871	271	23	23	13	10	2
Georgia	2	1	7	227	133	183	240	40	93	8	6	1
Florida	2	6	6	16	8	14	78	17	30	6	9	1
EAST SOUTH CENTRAL												
Kentucky	2	4	6	668	7	91	115	608	68	11	1	2
Tennessee	2	11	8	156	71	127	114	204	74	13	4	3
Alabama	8	13	12	482	215	700	274	13	68	16	4	2
Mississippi [2]	3	4	4	------	------	------	------	------	------	7	7	2
WEST SOUTH CENTRAL												
Arkansas	8	5	9	475	208	426	91	201	120	3	1	1
Louisiana	13	2	8	1,266	13	24	21	35	35	12	2	2
Oklahoma	5	6	7	567	82	231	63	20	20	4	0	0
Texas	42	50	42	4,388	1,589	1,693	476	199	217	29	13	2
MOUNTAIN												
Montana	0	4	4	149	1	25	218	163	163	2	0	0
Idaho	0	1	0	5	1	1	8	278	28	0	0	0
Wyoming	0	0	0	12	54	54	69	38	38	1	2	1
Colorado	6	15	6	175	93	85	220	366	94	1	0	0
New Mexico	2	0	2	3	2	8	8	7	31	0	1	0
Arizona	3	0	5	355	56	232	115	12	12	3	0	1
Utah [2]	0	1	2	798	------	20	14	271	38	1	2	0
Nevada	0	0	0	114	3	------	3	51	0	1	2	0
PACIFIC												
Washington	2	3	1	5	1	11	149	915	182	11	11	0
Oregon	5	0	1	93	32	32	75	562	163	2	11	1
California	35	20	20	389	84	175	766	425	428	49	24	1
Total	256	285	323	14,912	4,327	5,667	18,648	13,444	13,444	571	330	60
5 weeks	1,315	1,640	1,804	276,893	21,748	22,592	68,499	49,545	49,545	2,845	1,612	275

See footnotes at end of table.

Telegraphic morbidity reports from State health officers for the week ended February 5, 1944, and comparison with corresponding week of 1943 and 5-year median—Con.

Division and State	Poliomyelitis			Scarlet fever			Smallpox			Typhoid and paratyphoid fever [3]		
	Week ended—		Median 1939–43	Week ended—		Median 1939–43	Week ended—		Median 1939–43	Week ended—		Median 1939–43
	Feb. 5, 1944	Feb. 6, 1943		Feb. 5, 1944	Feb. 6, 1943		Feb. 5, 1944	Feb. 6, 1943		Feb. 5, 1944	Feb. 6, 1943	
NEW ENGLAND												
Maine	0	0	0	46	19	18	0	0	0	0	1	0
New Hampshire	0	0	0	12	14	6	0	0	0	0	0	0
Vermont	0	0	0	15	12	6	0	0	0	0	0	0
Massachusetts	0	0	0	385	438	205	0	0	0	2	0	1
Rhode Island	0	0	0	16	41	10	0	0	0	0	0	0
Connecticut	0	0	0	97	85	77	0	0	0	0	0	2
MIDDLE ATLANTIC												
New York	1	3	1	439	463	490	0	0	0	7	3	6
New Jersey	0	0	2	148	100	175	0	0	0	1	3	2
Pennsylvania	0	2	0	362	309	309	0	0	0	2	5	5
EAST NORTH CENTRAL												
Ohio	0	0	0	223	391	391	0	3	2	4	0	0
Indiana	2	0	0	158	161	161	1	10	4	70	2	1
Illinois	1	0	2	327	216	387	1	1	2	2	2	2
Michigan [2]	0	1	1	174	111	231	0	0	0	2	2	2
Wisconsin	0	0	0	291	254	180	0	0	2	1	0	0
WEST NORTH CENTRAL												
Minnesota	1	1	0	199	76	97	0	0	13	0	0	0
Iowa	0	0	0	185	57	74	1	0	1	0	3	3
Missouri	0	1	0	110	109	109	0	0	1	0	1	1
North Dakota	0	0	0	40	1	24	0	0	0	0	0	0
South Dakota	0	0	0	56	20	25	0	1	1	0	0	0
Nebraska	0	2	0	116	30	30	0	1	1	0	0	0
Kansas	0	3	0	115	81	90	1	3	2	0	0	0
SOUTH ATLANTIC												
Delaware	0	0	0	8	9	9	0	0	0	0	0	0
Maryland [3]	0	0	0	155	83	65	0	0	0	1	2	1
District of Columbia	0	0	0	184	21	19	0	0	0	0	0	0
Virginia	0	0	0	50	38	40	1	0	0	0	2	3
West Virginia	0	1	0	54	34	50	0	0	0	4	0	0
North Carolina	1	0	0	57	63	54	0	0	0	0	1	0
South Carolina	0	0	1	7	8	9	0	0	0	1	3	1
Georgia	0	0	1	15	28	27	1	0	0	3	2	2
Florida	1	3	0	17	13	13	0	0	0	7	0	2
EAST SOUTH CENTRAL												
Kentucky	1	1	1	84	46	84	1	1	1	0	0	0
Tennessee	0	1	0	36	40	67	1	0	0	1	1	1
Alabama	0	0	0	9	25	21	1	1	0	1	0	2
Mississippi [3]	0	1	1	2	12	12	1	0	0	5	0	2
WEST SOUTH CENTRAL												
Arkansas	0	0	0	6	5	10	0	0	0	8	1	2
Louisiana	1	0	0	10	16	15	0	0	0	3	2	5
Oklahoma	1	0	0	75	14	25	0	1	1	2	0	1
Texas	2	3	1	76	90	80	2	4	5	8	8	6
MOUNTAIN												
Montana	0	0	0	55	14	35	0	0	0	0	0	0
Idaho	0	0	0	40	18	8	0	2	1	0	0	0
Wyoming	0	0	0	12	70	8	0	0	0	0	0	0
Colorado	0	1	1	73	52	46	0	0	1	0	0	1
New Mexico	1	0	0	4	4	6	0	0	0	1	0	0
Arizona	0	1	0	12	10	9	0	0	0	0	0	1
Utah [2]	2	0	0	166	100	38	0	0	0	0	0	0
Nevada	0	0	0	2	3	0	0	0	0	0	1	0
PACIFIC												
Washington	0	0	1	192	28	32	0	0	0	0	1	1
Oregon	1	0	0	89	16	17	0	0	0	0	3	1
California	6	3	1	361	189	189	1	0	1	5	4	4
Total	22	28	28	5,365	4,037	4,037	13	28	59	131	48	83
5 weeks	141	164	160	22,431	18,187	18,187	62	155	248	384	249	400

See footnotes at end of table.

Telegraphic morbidity reports from State health officers for the week ended February 5, 1944, and comparison with corresponding week of 1943 and 5-year median—Con.

Division and State	Whooping cough			Week ended Feb. 5, 1944								
	Week ended—		Median 1939–43	Anthrax	Dysentery			Encephalitis, infectious	Leprosy	Rocky Mt. spotted fever	Tularemia	Typhus fever
	Feb. 5, 1944	Feb. 6, 1943			Amebic	Bacillary	Unspecified					
NEW ENGLAND												
Maine	5	114	29	0	0	0	0	0	0	0	0	0
New Hampshire	0	14	6	0	0	0	0	0	0	0	0	0
Vermont	33	19	23	0	0	0	0	0	0	0	0	0
Massachusetts	87	207	207	1	0	2	0	1	0	0	0	0
Rhode Island	13	27	27	0	0	0	0	0	0	0	0	0
Connecticut	35	59	74	0	0	12	0	1	0	0	0	0
MIDDLE ATLANTIC												
New York	158	361	395	0	5	22	0	1	0	0	0	0
New Jersey	61	143	143	0	0	0	0	0	0	0	0	0
Pennsylvania	103	347	364	0	0	0	0	0	0	0	0	0
EAST NORTH CENTRAL												
Ohio	87	248	248	0	1	0	0	1	0	0	1	0
Indiana	29	61	39	0	0	0	0	0	0	0	0	0
Illinois	53	161	161	0	0	0	0	1	0	0	1	0
Michigan [2]	99	216	232	0	0	0	0	0	0	0	0	0
Wisconsin	134	241	241	0	0	0	0	0	0	0	0	0
WEST NORTH CENTRAL												
Minnesota	43	74	65	0	3	0	0	0	0	0	0	0
Iowa	30	30	30	0	0	0	0	0	0	0	0	0
Missouri	14	15	28	0	0	0	4	0	0	0	0	2
North Dakota	7	9	15	0	0	1	0	1	0	0	0	0
South Dakota	0	15	8	0	0	0	0	0	0	0	0	0
Nebraska	3	7	6	0	0	0	0	0	0	0	0	0
Kansas	56	41	41	0	0	0	0	0	0	0	0	0
SOUTH ATLANTIC												
Delaware	3	5	3	0	0	0	0	0	0	0	0	0
Maryland [2]	27	47	61	0	0	0	0	0	0	0	0	0
District of Columbia	6	24	11	0	1	0	0	0	0	0	0	0
Virginia	117	105	65	0	0	0	51	0	0	0	0	1
West Virginia	43	67	55	0	0	0	0	0	0	0	0	0
North Carolina	151	177	224	0	0	0	0	0	0	0	0	2
South Carolina	52	70	71	0	0	1	0	0	0	0	0	4
Georgia	7	24	24	0	0	0	0	0	0	0	0	9
Florida	15	12	12	0	0	1	0	1	0	0	0	3
EAST SOUTH CENTRAL												
Kentucky	71	26	63	0	0	1	0	0	0	0	0	0
Tennessee	14	76	54	0	0	0	1	0	0	0	3	0
Alabama	19	26	22	0	0	0	0	0	0	0	1	10
Mississippi [2]	-----	-----	-----	0	0	0	0	0	0	0	4	1
WEST SOUTH CENTRAL												
Arkansas	17	19	19	0	0	1	0	0	0	0	1	0
Louisiana	5	3	5	0	2	2	0	0	0	0	0	1
Oklahoma	2	14	8	0	0	0	0	0	0	0	0	0
Texas	144	357	119	0	3	140	0	2	0	0	0	16
MOUNTAIN												
Montana	10	32	21	0	0	0	0	0	0	0	0	0
Idaho	12	3	3	0	0	0	0	0	0	0	0	0
Wyoming	7	2	2	0	0	0	0	0	0	0	0	0
Colorado	46	19	44	0	0	0	0	0	0	0	0	0
New Mexico	3	19	21	0	0	0	0	0	0	0	0	0
Arizona	18	1	17	0	0	0	0	0	0	0	0	0
Utah [2]	21	25	25	0	0	0	0	0	0	0	0	0
Nevada	2	12	0	0	0	0	0	0	0	0	0	0
PACIFIC												
Washington	78	20	39	0	0	0	0	0	0	0	0	0
Oregon	38	12	29	0	0	0	0	0	0	0	0	0
California	81	250	250	0	8	1	0	1	0	0	0	0
Total	2,054	3,856	4,246	1	18	184	56	10	0	0	11	49
5 weeks	9,123	19,739	21,336	4	117	1,199	270	44	3	0	65	248
5 weeks, 1943				8	91	708	177	48	4	1	109	317

[1] New York City only.
[2] Period ended earlier than Saturday.
[3] Including paratyphoid fever cases reported separately, as follows: New Jersey, 1; New York, 2; Georgia, 1; Florida, 1.

WEEKLY REPORTS FROM CITIES

City reports for week ended Jan. 22, 1944

This table lists the reports from 86 cities of more than 10,000 population distributed throughout the United States, and represents a cross section of the current urban incidence of the diseases included in the table.

	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
NEW ENGLAND												
Maine:												
Portland	0	0	------	0	6	0	7	0	3	0	0	3
New Hampshire:												
Concord	0	0	------	1	0	0	0	0	1	0	0	0
Vermont:												
Barre	0	0	------	0	1	0	0	0	0	0	0	0
Massachusetts:												
Boston	1	0	------	4	51	12	27	0	61	0	0	24
Fall River	0	0	------	1	0	0	1	0	6	0	0	6
Springfield	0	0	------	0	85	1	0	0	7	0	0	10
Worcester	0	0	------	0	2	1	9	0	53	0	0	5
Rhode Island:												
Providence	0	2	3	1	116	6	3	0	7	0	0	9
Connecticut:												
Bridgeport	0	0	------	0	3	1	2	0	9	0	0	0
Hartford	1	0	1	0	1	3	5	1	6	0	0	0
New Haven	0	0	------	1	3	3	1	0	10	0	0	0
MIDDLE ATLANTIC												
New York:												
Buffalo	0	0	------	1	5	4	12	1	15	0	0	3
New York	10	2	15	8	533	42	108	0	216	0	0	46
Rochester	0	0	------	1	1	2	4	0	1	0	0	7
Syracuse	0	0	------	0	0	0	1	0	6	0	0	19
New Jersey:												
Camden	1	0	2	3	0	1	2	0	13	0	0	1
Newark	0	0	9	1	30	4	14	0	21	0	1	11
Trenton	0	0	3	0	1	0	4	0	6	0	0	0
Pennsylvania:												
Philadelphia	2	0	21	21	8	14	51	0	53	0	0	6
Pittsburgh	0	0	9	8	0	1	19	0	21	0	1	5
Reading	0	0	5	1	4	0	2	0	4	0	0	4
EAST NORTH CENTRAL												
Ohio												
Cincinnati	1	0	7	9	5	4	9	0	42	0	0	9
Cleveland	0	0	9	3	443	6	14	0	69	0	1	27
Columbus	0	0	5	5	39	0	5	0	17	0	0	3
Indiana.												
Fort Wayne	0	0	------	1	53	0	5	0	0	0	0	0
Indianapolis	5	0	------	6	5	5	7	0	43	0	0	7
South Bend	0	0	------	0	13	0	0	0	2	0	0	0
Terre Haute	2	0	------	0	0	2	3	0	0	0	0	0
Illinois·												
Chicago	1	0	10	4	28	11	33	0	91	0	0	35
Springfield	0	0	------	0	48	0	2	0	4	0	0	0
Michigan:												
Detroit	8	0	25	3	23	7	20	0	56	0	1	23
Flint	0	0	------	0	3	0	0	0	2	0	0	0
Grand Rapids	0	0	------	1	120	1	2	0	10	0	0	1
Wisconsin:												
Kenosha	0	0	------	0	0	0	1	0	2	0	0	3
Milwaukee	0	0	8	8	14	2	8	0	51	0	0	11
Racine	0	0	------	0	2	0	0	0	7	0	0	7
Superior	0	0	------	0	46	0	0	0	9	0	0	0
WEST NORTH CENTRAL												
Minnesota:												
Duluth	0	0	------	0	8	0	2	0	20	0	0	10
Minneapolis	0	0	------	3	133	2	4	0	29	0	0	9
St. Paul	0	0	------	1	98	2	5	0	43	0	0	8
Missouri:												
Kansas City	1	0	1	2	4	1	10	0	30	0	0	2
St. Joseph	0	0	------	0	0	1	0	0	2	0	0	0
St. Louis	0	0	9	5	45	4	18	0	23	0	0	6
Nebraska:												
Omaha	2	0	------	1	1	0	7	0	25	0	0	0
Kansas:												
Topeka	0	0	------	2	0	0	7	0	0	0	0	2
Wichita	0	0	2	0	48	0	4	0	4	0	0	0

City reports for week ended Jan. 22, 1944—Continued

	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
SOUTH ATLANTIC												
Delaware.												
Wilmington	1	0		0	10	0	0	0	0	0	0	0
Maryland:												
Baltimore	4	0	15	3	102	9	36	0	36	0	0	7
Cumberland	0	0		0	0	0	0	0	0	0	0	0
Frederick	0	0		0	0	0	1	0	0	0	0	0
District of Columbia:												
Washington	2	0	44	0	36	4	12	0	50	0	0	2
Virginia:												
Lynchburg	0	0	43	1	15	1	3	0	0	0	0	5
Richmond	0	0	4	2	17	7	6	0	5	0	1	0
Roanoke	0	0		0	6	0	0	0	0	0	0	0
West Virginia:												
Charleston	0	0	1	0	7	0	0	0	5	0	0	1
Wheeling	0	0	1	2	1	1	1	0	3	0	0	0
North Carolina												
Winston-Salem	0	0		0	60	0	1	0	0	0	0	3
South Carolina.												
Charleston	0	0	105	3	5	1	2	0	1	0	0	0
Georgia:												
Atlanta	0	0	90	2	12	1	5	0	5	0	0	0
Brunswick	0	0	4		82	0	1	0	1	0	0	0
Savannah	0	0	37	2	0	4	6	0	0	0	0	0
Florida:												
Tampa	0	0	15	1	1	3	2	0	3	0	0	0
EAST SOUTH CENTRAL												
Tennessee												
Memphis	0	1	28	5	1	6	6	0	7	0	1	24
Nashville	0	0	36	4	3	0	7	0	9	0	0	0
Alabama:												
Birmingham	0	0	92	1	8	2	7	0	4	0	0	4
Mobile	1	0	35	6	0	0	3	0	0	0	0	0
WEST SOUTH CENTRAL												
Arkansas												
Little Rock	0	0	7	1	8	0	8	0	0	0	0	0
Louisiana.												
New Orleans	3	0	14	5	3	4	19	3	3	0	2	0
Shreveport	0	0		4	0	0	5	0	0	0	0	0
Texas:												
Dallas	2	0	2	2	4	0	8	0	2	0	0	0
Galveston	1	0	429	0	0	0	5	0	1	0	1	0
Houston	2	0		6	6	4	8	0	3	0	1	0
San Antonio	2	0	8	6	7	3	10	0	0	0	0	1
MOUNTAIN												
Montana												
Billings	0	0		0	0	0	2	0	0	0	0	0
Great Falls	0	0	130	0	7	1	0	0	14	0	0	0
Helena	0	0		0	1	0	1	0	0	0	0	0
Missoula	0	0	51	1	0	0	2	0	1	0	0	0
Idaho:												
Boise	0	0	83	0	0	0	0	0	5	0	0	2
Colorado:												
Denver	1	0	10	1	18	1	5	0	12	0	0	16
Pueblo	0	0		1	78	0	2	0	1	0	0	11
PACIFIC												
Washington:												
Seattle	0	0		5	0	0	10	0	0	0	0	0
Spokane	0	0	2	1	54	0	1	0	29	0	0	0
Tacoma	1	0		3	3	0	0	0	4	0	0	1
California:												
Los Angeles	6	0	91	7	63	6	13	1	44	0	0	4
Sacramento	0	0	16	1	2	4	4	0	3	0	0	0
San Francisco	0	0	89	2	16	6	18	0	18	0	0	3
Total	61	5	1,626	184	2,545	211	658	6	1,369	0	10	406
Corresponding week, 1943	69	2	212	53	2,665	107	621	1	1,236	1	13	1,200
Average, 1939-43	100		2,717	[1] 65	[2] 2,629		[1] 588		1,213	13	16	1,136

[1] 3-year average, 1941-43.   [2] 5-year median.

Dysentery, amebic.—Cases: New York, 4.

Dysentery, bacillary.—Cases: Providence, 3; New York, 6; Detroit, 1; Charleston, S. C., 2; Tampa, 1; Los Angeles, 2.

Dysentery, unspecified.—Cases: Cincinnati, 1; San Antonio, 2.

Typhus fever.—Cases: Savannah, 1; New Orleans, 2; San Antonio, 1.

Rates (annual basis) per 100,000 population, by geographic groups, for the 86 cities in the preceding table (estimated population, 1942, 34,493,600)

	Diphtheria case rates	Encephalitis, infectious, case rates	Influenza		Measles case rates	Meningitis, meningococcus, case rates	Pneumonia death rates	Poliomyelitis case rates	Scarlet fever case rates	Smallpox case rates	Typhoid and paratyphoid fever case rates	Whooping cough case rates
			Case rates	Death rates								
New England	5.0	5.0	10	19.9	668	67 3	137	2.5	406	0.0	0.0	142
Middle Atlantic	5 8	0.9	29	19 7	260	30 4	97	0 4	159	0.0	0.9	46
East North Central	10 0	0 0	37	23 4	493	22.3	64	0 0	237	0 0	1 2	74
West North Central	5 9	0.0	24	27 8	668	19 8	113	0.0	349	0.0	0.0	73
South Atlantic	12 2	0 0	625	27 8	616	53 9	132	0.0	190	0.0	1.7	31
East South Central	6 0	6 0	1,138	95 3	71	47 6	137	0 0	119	0.0	6 0	167
West South Central	29 4	0 0	1,353	70 6	82	32 4	185	8 8	26	0 0	11.8	3
Mountain	10 6	0 0	2,903	31 8	1,102	21 2	127	0 0	350	0 0	0.0	307
Pacific	12 3	0 0	347	33 3	242	28 0	81	1 8	172	0 0	0 0	14
Total	9.2	0 8	216	27 9	404	32 0	100	0 9	208	0 0	1 5	62

TERRITORIES AND POSSESSIONS

Hawaii Territory

Plague (human).—Under date of January 26, 1944, a case of plague in a 12-year-old girl, with onset of illness on January 15, 1944, resulting in death on January 19, has been reported from the vicinity of Honokaa, Hamakua District, Island of Hawaii, T. H. Diagnosis has been confirmed. The father of this girl was reported to be ill with the disease, as diagnosed clinically.

Plague (rodent).—Rats proved positive for plague have been reported in Hamakua District, Island of Hawaii, T. H., as follows:

Date found	Number of rats found	Location	Date found	Number of rats found	Location
Nov. 27, 1943	1	Paauhau area.	Dec. 20, 1943	1	Paauhau area.
Nov. 29, 1943	2	Do.	Dec. 22, 1943	1	Kukuihaele area.
Dec. 6, 1943	1	Do.	Jan. 6, 1944	1	Do.
Dec. 10, 1943	2	Kukuihaele area.	Jan. 7, 1944	1	Do.
Dec. 14, 1943	1	Do.	Jan. 12, 1944	1	Do.
Dec. 17, 1943	1	Kapulena area.			

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—Week ended January 8, 1944.—During the week ended January 8, 1944, cases of certain communicable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox		18		97	412	39	59	164	103	892
Diphtheria		6	6	72	2		8	5		94
German measles				3	13		4	9	4	33
Influenza	3	171	1		766	2			818	1,761
Measles		7		83	270	1	15	91	28	495
Meningitis, meningococcus		1		2	4				2	9
Mumps		4		56	160	19	2	28	48	317
Poliomyelitis				1	1			2		4
Scarlet fever		10	4	40	163	28	12	49	14	320
Tuberculosis (all forms)		20	7	10	38	14		5	27	121
Typhoid and paratyphoid fever				2	1					3
Whooping cough		7		16	70	1	14	1	13	122

CUBA

Provinces—Notifiable diseases—4 weeks ended January 1, 1944.—During the 4 weeks ended January 1, 1944, cases of certain notifiable diseases were reported in the Provinces of Cuba as follows:

Disease	Pinar del Rio	Habana [1]	Matanzas	Santa Clara	Camaguey	Oriente	Total
Cancer		1	1		2	8	12
Chickenpox			1			1	2
Diphtheria		38	6	1		2	47
Hookworm disease		27					27
Leprosy						1	1
Malaria	19	12	16	29	21	447	574
Measles	10	39		1		1	51
Poliomyelitis						1	1
Scarlet fever		1					1
Tuberculosis	10	8	8	17	1	27	71
Typhoid fever	9	44	9	16	9	18	105
Whooping cough	1						1

[1] Includes the city of Habana.

JAMAICA

Notifiable diseases—4 weeks ended January 15, 1944.—During the 4 weeks ended January 15, 1944, cases of certain notifiable diseases were reported in Kingston, Jamaica, and in the island outside of Kingston, as follows:

Disease	Kingston	Other localities	Disease	Kingston	Other localities
Cerebrospinal meningitis	1	1	Erysipelas	1	1
Chickenpox	2	8	Leprosy	--	3
Diphtheria	2	4	Tuberculosis	23	54
Dysentery	4	4	Typhoid fever	7	47

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

NOTE.—Except in cases of unusual prevalence, only those places are included which had not previously reported any of the above mentioned diseases, except yellow fever, during the current year. All reports of yellow fever are published currently

A cumulative table showing the reported prevalence of these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month

(Few reports are available from the invaded countries of Europe and other nations in war zones)

Plague

Belgian Congo—Stanleyville Province.—During the week ended January 22, 1944, 3 deaths from plague including 1 death from septicemic plague were reported in the villages of Kalinda and Komba, Stanleyville Province, Belgian Congo.

Egypt.—Plague has been reported in Egypt as follows: week ended January 8, 1944, Port Said, 1 case, 1 death; Suez, 22 cases, 18 deaths.

Morocco—Casablanca.—During the period December 11–20, 1943, 1 case of plague was reported in Casablanca, Morocco.

Senegal—Tivaouane—Saou.—During the period November 21–30, 1943, 7 deaths from suspected plague, 2 of which have been confirmed, were reported in the village of Saou, subdivision of Tivaouane, Senegal.

Smallpox

Egypt—Port Said.—A report dated January 18, 1944, states that on this date 20 cases of smallpox exist in Port Said, Egypt. One death from smallpox has been reported since January 1, 1944.

X

FEDERAL SECURITY AGENCY

UNITED STATES PUBLIC HEALTH SERVICE

THOMAS PARRAN, *Surgeon General*

DIVISION OF PUBLIC HEALTH METHODS

G. ST. J. PERROTT, *Chief of Division*

The PUBLIC HEALTH REPORTS, first published in 1878 under authority of an act of Congress of April 29 of that year, is issued weekly by the United States Public Health Service through the Division of Public Health Methods, pursuant to the following authority of law: United States Code, title 42, sections 7, 30, 93; title 44, section 220.

It contains (1) current information regarding the prevalence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

The PUBLIC HEALTH REPORTS is published primarily for distribution, in accordance with the law, to health officers, members of boards or departments of health, and other persons directly or indirectly engaged in public health work. Articles of special interest are issued as reprints or as supplements, in which forms they are made available for more economical and general distribution.

Requests for and communications regarding the PUBLIC HEALTH REPORTS, reprints, or supplements should be addressed to the Surgeon General, United States Public Health Service, Washington, D. C. Subscribers should remit direct to the Superintendent of Documents, Washington, D. C.

Librarians and others should preserve their copies for binding, as the Public Health Service is unable to supply the general demand for bound copies. Indexes will be supplied upon request.

UNITED STATES GOVERNMENT PRINTING OFFICE, WASHINGTON · 1944

For sale by the Superintendent of Documents, Washington 25, D. C.
Price 5 cents. Subscription price $2.50 a year

Public Health Reports

VOLUME 59 FEBRUARY 18, 1944 NUMBER 7

IN THIS ISSUE

Comparison of Mosquito Collections in Puerto Rico

Susceptibility of the Golden Hamster to Plague

CONTENTS

Public Health Reports

Vol. 59 • **FEBRUARY 18, 1944** • *No. 7*

I. A COMPARISON OF LIGHT TRAP AND ANIMAL BAIT TRAP ANOPHELINE MOSQUITO COLLECTIONS IN PUERTO RICO. II. A LIST OF THE MOSQUITOES OF PUERTO RICO

By A. EARL PRITCHARD and HARRY D. PRATT, *United States Public Health Service*

INTRODUCTION

It has generally been accepted, following the work of Le Prince and Orenstein (*2*) in Panama, that *Anopheles albimanus* is not attracted to light. The experience of these authors indicated that Panamanian representatives of this species may actually be repelled by light: "It is interesting to note that both species [*A. albimanus* and *A. tarsimaculatus*] were to some extent afraid of the light of a lantern at night. . . . If the lantern were behind the neck the face was bitten, and on bringing the light around toward the face, they immediately ceased operations on it and collected on the back of the neck, and continued biting vigorously. . . . When bright acetylene lights with reflectors (automobile lamps) were used at Corozal an observer standing in the direct rays and holding his bare arms in them ten feet away from the lamp was never bitten. Yet when an obstruction was placed in the column of light and one inch of finger put behind the obstruction, in its shadow, several *Anopheles albimanus* settled on that finger in less than one minute."

Tulloch (*6*), in a study of the mosquitoes of Puerto Rico, reported on the use of a box type light trap employing a 200-watt bulb. Of the three species of anophelines occurring on this Island, only one, *A. grabhamii*, was reported to have been taken occasionally in the light trap.

The suction type of light trap has been used with varying success as a means of gauging anopheline populations in the United States. It has been shown that *A. crucians*, *A. walkeri*, and *A. atropos*, for instance, are readily attracted to lights. *A. quadrimaculatus*, on the other hand, is believed to be less readily attracted than these species.

A preliminary study has been made on the use of the suction type of light trap in sampling adult populations of *A. albimanus*, *A. grabhamii*, and *A. vestitipennis* in Puerto Rico. The results of this

study are here presented. All three species have been taken in large numbers by the light trap and, in many cases, in considerably greater numbers than with comparative collections by animal bait traps.

This study has been carried on in connection with the Malaria Control in War Areas Program of the United States Public Health Service. Observations have been made principally at three projects located at Losey Field, the Salinas Maneuver Area, and Fort Buchanan, Puerto Rico. Incidental observations have been made in connection with other Army, Navy, and Coast Guard installations on the Island.

METHODS PREVIOUSLY USED FOR SAMPLING ADULT POPULATIONS OF ANOPHELINES IN PUERTO RICO

Hand collections from diurnal resting places.—The first attempt at measuring the density of *A. albimanus* adults in Puerto Rico was that based upon hand collections made in diurnal resting places. H. W. Greene, working with the Rockefeller Foundation during 1921–23, made intensive studies of this method. His work [1] showed that such collections could not be considered as a satisfactory index of *A. albimanus* populations in Puerto Rico, although this method has been used with considerable success with *A. quadrimaculatus* in the United States. These conclusions have been substantiated by subsequent work of the Insular Health Department and the United States Public Health Service. *A. grabhamii* has been collected more frequently and in larger numbers in diurnal resting places, but such collections have not proved to afford a satisfactory index of adult populations of this species.

Hand collections from animals.—During 1923–26, hand collections of anophelines feeding on a horse or cow in the field were made over regular time intervals in the evening. This method involved close inspection of the animal for an hour or two with the aid of a flashlight and capture of the anophelines. It was abandoned following the adoption of the animal bait trap.

Animal bait traps.—The stable trap, or animal bait trap, was first used in the West Indies in 1923, by Dr. George C. Payne at the suggestion of Dr. H. H. Howard. This trap (fig. 1) consists of a small building which is about 8 feet long, 5½ feet wide, and 5½ feet high. A door is provided at one end of the trap. The upper half of the walls is screened, and the lower half is made of plywood or sheet metal. In the middle of the side walls is a longitudinal opening which is V-shaped with the apex directed inwards to permit entrance, and to discourage exit, of the mosquitoes. An animal, usually a small horse or calf, is placed in the trap overnight, and anopheline collections are

[1] A copy of this manuscript is filed at the Hospital, Central Aguirre, near Salinas.

FIGURE 1.—The animal bait trap. Dimensions are 8 x 5.5 x 5.5. Note V-shaped entrance opening below screen.

FIGURE 2.—The mosquito light trap

made early in the morning before the adult mosquitoes have found the exit or have been destroyed by predators.

W. C. Earle first used this type of trap in Puerto Rico in 1926, near Salinas. Following the extensive work on this island, the animal bait trap has been accepted as a satisfactory method for sampling adult anopheline populations, and it has been used with considerable success in Puerto Rico during the past 17 years. The original design of the trap was modified by Earle and also by Magoon (*3*) working on other West Indian islands. Other workers in the Caribbean and Central and South America have also used the animal bait trap.

THE LIGHT TRAP

The suction type of light trap (fig. 2) consists of a vertical cylinder of galvanized sheet metal, 9 inches inside diameter and 12 inches long. A conical roof of galvanized sheet metal, 16 inches in diameter, is placed above this tube to keep out the rain and protect the light bulb suspended from the roof. At the upper end of the tube is a fan with the air blast directed downward. In operation, mosquitoes attracted to the light are driven downward through a funnel made of 16-mesh copper or bronze screening into a cyanide killing jar which is attached to the bottom of the funnel. An automatic time switch is usually provided to start and stop the trap, usually from 6:00 p. m. to 6:00 a. m. in Puerto Rico, or the trap may be started every evening and stopped every morning by hand. Collections may be made daily by field inspectors and sorted at field stations, or shipped in specimen tins into a central office for sorting and identification. If the latter procedure is followed, collections in the tropics should be shipped every day to prevent the collections becoming mouldy. This trap has been described in detail by Headlee (*4*) and Mulhern (*5*) with illustrations showing detailed construction.

COMPARISON OF LIGHT TRAP AND ANIMAL BAIT TRAP COLLECTIONS

In making comparative collections with the light trap and with the animal bait trap, it is important that the two traps be sufficiently distant from each other so that the collection of each is independent of the other. The effect of having the two traps adjacent was shown at the camp site of the Salinas Maneuver Area (fig. 6). The bait trap under these conditions gave considerably higher catches of *A. albimanus* than could be expected on a basis of the very low catches in a number of other bait traps in that vicinity. When the bait trap was moved 200 feet distant, the catches in this trap then dropped to a low level comparable to the other bait traps. In general, comparisons have been made with the two types of traps separated by a distance of from 200 to 500 feet.

In consideration of the operation of the light trap, the intensity of the light is a variable factor. Ordinarily, a 40-, 50-, or 60-watt bulb has been used. The writers have not been able to detect any significant differences between anopheline attraction to bulbs of these wattages. At Losey Field (fig. 4) no difference was apparent in a continuous run when a 50-watt bulb was replaced by a 60-watt bulb. Later, the bulbs in three light traps operating near this base were simultaneously changed from 60 watts to 40 watts, and no difference in any of the collections was apparent. At Fort Buchanan, however, a 25-watt bulb was found to collect, in relation to the bait trap, proportionally less anophelines than either a 40- or 50-watt bulb (fig. 7).

In consideration of the operation of the animal bait trap, the animal represents a variable factor. There is a considerable difference in the attraction offered by various species of animals and various individuals of the same species. It has been desirable, therefore, to make several different series of comparative runs each employing a single animal that is ordinarily used for making bait trap collections.

No analysis has been attempted of the factors affecting the phototropic or trophotropic responses of the Puerto Rican anophelines. The light trap attracts females which may or may not have fed previously, and the proportion of engorged specimens in light trap collections is subject to considerable variation. The animal bait trap attracts only females in search of a meal.

Anopheles albimanus Wiedemann.—*A. albimanus* is the predominant anopheline in Puerto Rico and is the principal vector of malaria on the island. Larval collections, animal bait trap, and light trap collections all show this species to be the most abundant anopheline except in local instances. At Losey Field, on the south shore of Puerto Rico, individual light trap collections of *A. albimanus* have been consistently higher than those from animal bait traps and have exceeded any bait trap collections made during the past 2 years. Nightly collections of *A. albimanus* females during the period December 7–14, 1943, at Losey Field ranged from 320 to 828 specimens, whereas animal bait trap collections attained a maximum of only 245 females (on December 8) in one instance when a calf was used as bait and 238 in another when a horse was used (table 1, fig. 3).

Figure 4 gives a comparison of light trap and animal bait trap (horse) collections at Losey Field during January 1942. It shows that collections of *A. albimanus* in the bait trap were very low throughout the month, ranging from 7 to none, and that following January 11 no more than 5 were taken in any single collection. Five or fewer females per night have been accepted in Puerto Rico as a standard of satisfactory control. In the light trap, on the other hand, collections ranged from 13 to 38 during the first half of the month, which indicates significantly high populations of *A. albimanus*. From January

TABLE 1.—*Comparison of light trap (40 watts) with animal bait trap (horse) and animal bait trap (calf) on south side of Losey Field, Puerto Rico, December 2–18, 1942*

Date	Light trap				Horse trap		Calf trap	
	Albimanus		*Grabhamii*		*Albimanus*	*Grabhamii*	*Albimanus*	*Grabhamii*
	Male	Female	Male	Female	Female	Female	Female	Female
Dec. 2					50	3	7	1
Dec. 3	0	152	0	0				
Dec. 4	1	162	0	1				
Dec. 5	1	442	0	0				
Dec. 6	0	105	0	0				
Dec. 7	6	652	0	1				
Dec. 8	0	320	0	0	238	2	245	2
Dec. 9	1	701	0	0				
Dec. 10	0	774	0	0				
Dec. 11	0	362	0	0				
Dec. 12	0	718	0	0				
Dec. 13	0	828	0	0				
Dec. 14	0	432	0	0				
Dec. 15	0	111	0	1				
Dec. 16	0	136	0	0	19	0	44	4
Dec. 17	0	66	0	0				
Dec. 18	0	91	0	0				

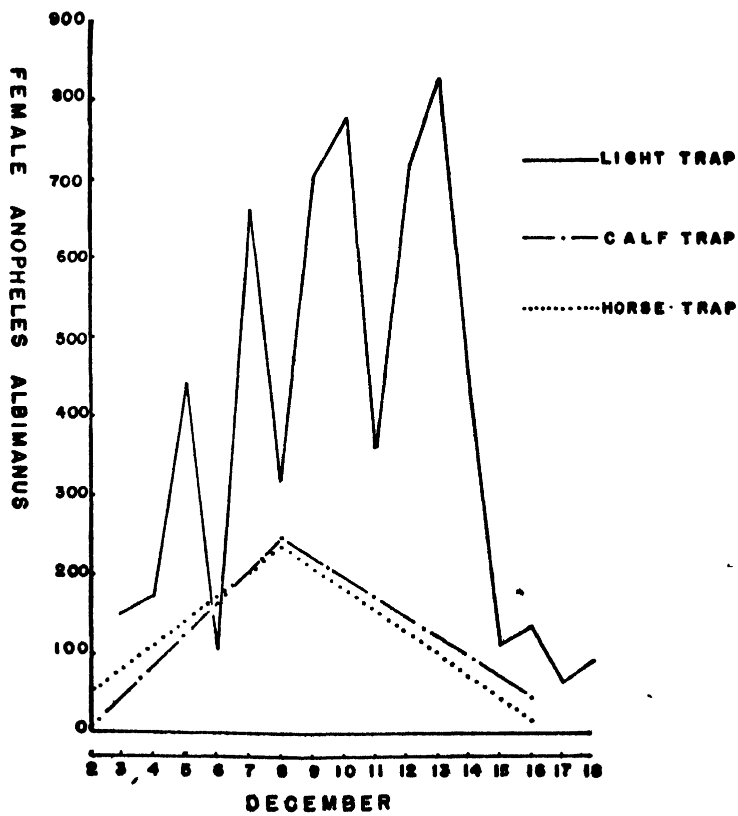


FIGURE 3.—Comparison of light trap (40 watts) with animal bait trap (horse) and animal bait trap (calf) on south side of Losey Field, P. R., Dec. 2–18, 1942.

16 to 22, the light trap catches were comparable to those of the bait trap, but following this, the collections rose to a peak of 21 females on a night when none was taken in the bait trap.

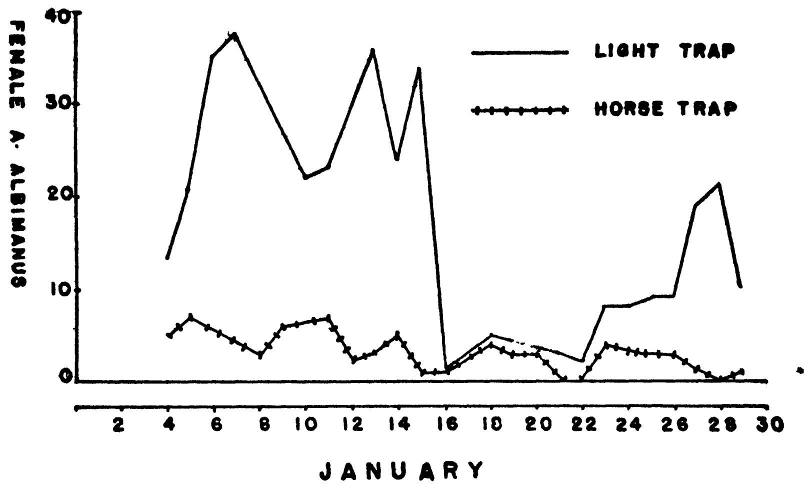


FIGURE 4.--Comparison of light trap (50 watts and 60 watts) with animal bait trap (horse) on northeast corner of Losey Field, P. R., Jan. 4-29, 1943.

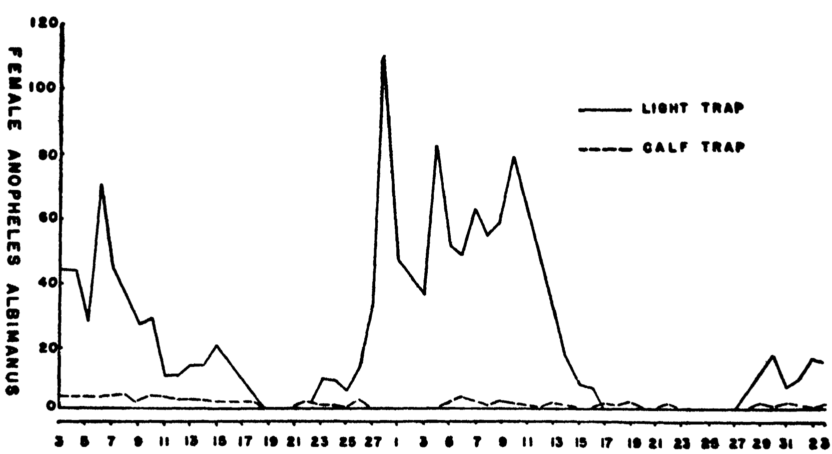


FIGURE 5.—Comparison of light trap (60 watts) with animal bait trap (calf) at Hacienda Ursula near Losey Field, P. R., Feb. 3-Apr. 3, 1943.

Figure 5 gives a comparison of light trap and animal bait trap (calf) collections at Hacienda Ursula, one-half mile east of Losey Field, made during a period of 2 months (February 1 to April 3). The maximum collection in the bait trap was 5 *A. albimanus*, all of the other collections being 4 or less. The catches of this trap were checked at intervals by operating other traps in the vicinity with the result that even lower catches were made. The light trap, however,

showed definite and significant changes in the population and indicated two marked peaks of *A. albimanus* abundance during this period, the first reaching 70 on February 6 and the second reaching 110 near

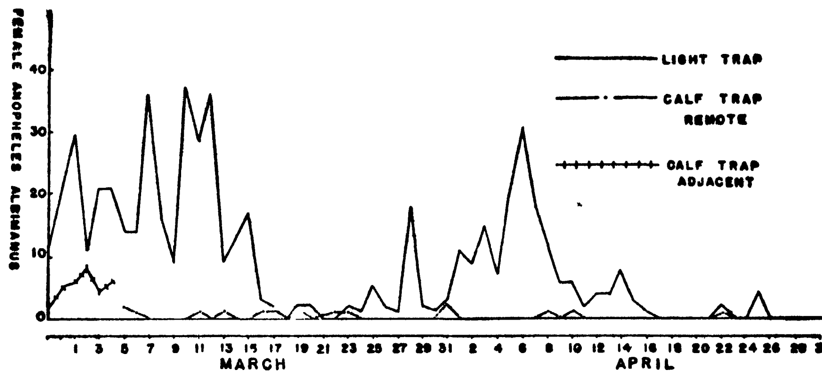


FIGURE 6.—Comparison of light trap (60 watts) with animal bait (calf) at the Salinas Maneuver Area, P. R., Feb. 27–Apr. 30, 1943.

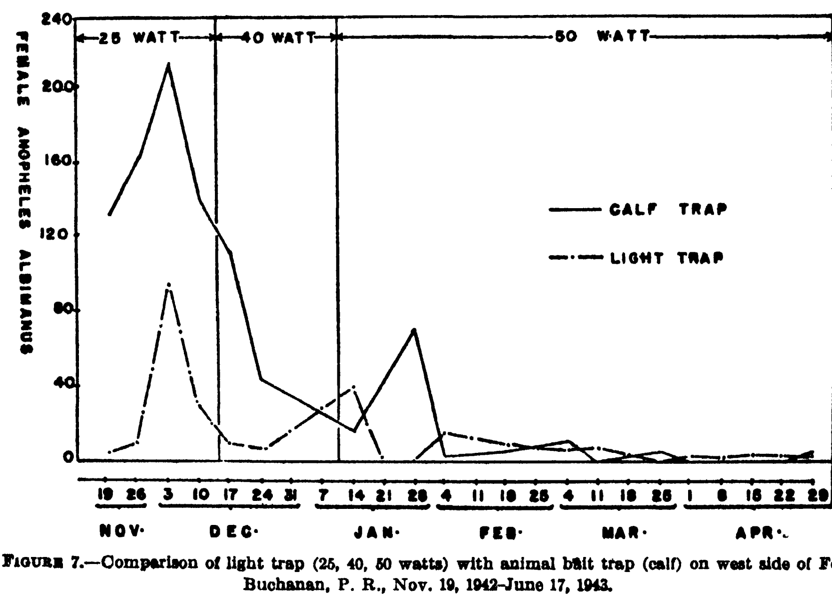


FIGURE 7.—Comparison of light trap (25, 40, 50 watts) with animal bait trap (calf) on west side of Fort Buchanan, P. R., Nov. 19, 1942–June 17, 1943.

the end of February. Again, at the Salinas Maneuver Area during March and April (fig. 6), excellent control was indicated by the bait trap, the collections ranging from 2 to none. Light trap collections on the other hand ranged from 9 to 38 females during the first half of March, and up to 31 females during the first part of April, thus indicating moderate populations during these periods.

At Fort Buchanan, on the north shore of the Island, a comparison of collections (fig. 7) shows that during the latter part of November

and the first part of December, when a 25-watt bulb was used in the trap, lower numbers were taken in the light trap than in the bait trap. During the remainder of the period over which comparisons were made (December 15 through May) 40- or 50-watt bulbs were used and somewhat higher collections occurred. When low numbers (less than 10 females) were taken in both traps, the collections were found to be similar, but the maximum light trap catch each week was somewhat higher than the single weekly bait trap collection.

Comparisons were also made at Camp O'Reilly, near the center of the Island, and at Camp Tortuguero on the north shore. At the former, single animal bait trap collections during the 3-month period March–May ranged from none to 2 *A. albimanus* females, while the light trap catches ranged from none to 18. At the latter location collections from two light traps and comparative bait traps operated from February through May were all very low, and both types of traps gave similar collections of from none to several females.

Males of *A. albimanus* are taken in the light trap with less frequency and in fewer numbers than females. However, in low collections (less than 10) the sexes may occur in equal numbers or, rarely, with a preponderance of males. The highest collection of males which has been noted was 48 (together with 588 females) taken 1½ miles east of Losey Field on May 25. This is a point in favor of the use of light traps over animal bait traps. Due to the short flight range of the males, the numbers taken indicate the proximity of the breeding areas, and also many neotropical species of the subgenus *Nyssorhynchus*, to which *A. albimanus* belongs, are not recognizable with certainty except by characters of the male terminalia. At least one other species of *Nyssorhynchus* is known to be attracted to light. The writers have seen 2 males and over 100 females of *A aquasalis* which the late Dr. W. A. Hoffman collected at lights at Gros Islet, Santa Lucia, in July 1941. With expansion of malaria control activities in the southern Caribbean and in South America, the light trap may prove to be of considerable aid in collection of males for the determination of the species under consideration.

Anopheles grabhamii Theobald—*A. grabhamii* is second in importance to *A albimanus* in Puerto Rico. Because of its more restricted breeding habitats, this species is more local in its distribution. Considerable numbers, however, are frequently encountered. Although experimental evidence indicates that *A. grabhamii* is an efficient vector of malaria, its relative importance in the transmission of this disease has not been adequately determined. The probable importance of this species has been minimized due to its reported indifference to humans in Puerto Rico (*1*). It may be noted here, however, that 127 female *A. grabhamii* were taken from an animal

bait trap at Camp Tortuguero on November 26, 1942, following a night during which a soldier slept in the trap.

That the light trap may collect considerable numbers of *A. grabhamii* was demonstrated at Harvey's Dairy, near Carolina, P. R. (table 3), where as many as 303 females of this species were taken in a single catch. The light trap, however, does not appear to be generally as favorable for large collections of this species as the animal bait trap. In eight comparative collections made two miles southeast of Losey Field, 1,047 female *A. grabhamii* were taken in the bait trap (calf), while only 172 females were taken in the light trap (table 2).

When dealing with very low populations, the light trap collections and animal trap collections of *A. grabhamii* may be comparable. At the Salinas Maneuver Area, 27 females of this species were taken in the animal bait trap (horse) and only 9 in the light trap in 50 comparative collections. On the other hand, at Hacienda Ursula, near Losey Field, in 40 comparative collections 17 females were taken in the animal bait trap (calf) and 36 in the light trap.

TABLE 2.—*Comparison of light trap (40 watts) with animal bait trap (calf) at Finca Ferrer near Losey Field, Puerto Rico, May 13–24, 1943*

Date	Light trap						Calf trap		
	Albimanus		*Grabhamii*		*Vestitipennis*		*Albimanus*	*Grabhamii*	*Vestitipennis*
	Male	Female	Male	Female	Male	Female	Female	Female	Female
May 13							16	44	263
May 14							2	27	39
May 15	0	65	0	40	0	5	16	65	9
May 16	2	36	3	20	0	2	7	149	8
May 17	5	26	1	14	0	1	38	170	12
May 18	3	58	0	13	0	1	180	190	16
May 19							21	340	0
May 20							3	35	2
May 21	0	29	0	3	0	1	10	59	4
May 22	1	117	0	12	0	0	43	6	1
May 23	0	463	0	43	0	1	9	69	12
May 24	2	134	0	27	0	2	4	39	0

TABLE 3.—*Collections made in a light trap (40 watts) in Harvey's Dairy, Km. 6, Carretera Loiza, near Carolina, Puerto Rico, February 18–27, 1943*

Date	*A. albimanus*		*A. grabhamii*		*A. vestitipennis*	
	Female	Male	Female	Male	Female	Male
Feb. 18	59	1	187	7	3	0
Feb. 19	21	0	186	7	7	0
Feb. 20	64	1	303	16	9	0
Feb. 21	67	1	251	5	7	0
Feb. 22	59	3	141	7	5	1
Feb. 23	62	3	183	5	4	0
Feb. 24	31	1	30	1	3	0
Feb. 25	77	0	193	2	4	0
Feb. 26	78	1	143	8	2	0
Feb. 27	62	1	154	7	5	0

The available data indicate that males of *A. grabhamii* are more readily attracted to the light trap than males of *A. albimanus*. When the populations are low, a nearly equal sex ratio is more frequently encountered. As many as 31 males (and 11 females) were taken in one collection near Losey Field early in June 1943.

Anopheles vestitipennis Dyar and Knab.—The evidence at hand is inadequate to show whether *A. vestitipennis* is an efficient vector of malaria. It is the least abundant of the Puerto Rican anophelines, and the most local in distribution. Occasionally, however, considerable numbers may be encountered. Because of its general scarcity and short flight range, it is generally considered secondary in importance in malaria control. The finding of 80 female *A. vestitipennis* in a bait trap in which a soldier had slept during the night indicates that the species is readily attracted to man. This occurred on the night of November 25, 1942, at Camp Tortuguero.

The available evidence indicates that *A. vestitipennis* and *A. grabhamii* behave similarly with regard to the relative attractiveness to the females of light traps and animal bait traps. At Ursula, near Losey Field, in 40 comparative runs, only 3 females of *A. vestitipennis* were taken in the bait trap (calf), while 23 females were taken with the light trap. Similarly at Camp Tortuguero in one series of 7 comparative runs made weekly, 4 females were taken in the light trap and none was taken in the animal bait trap (calf); and in another series of 8 comparative runs, 2 females were taken in the light trap and none was taken in the bait trap (calf). On the other hand, in 8 comparative runs made 2 miles east of Losey Field there were 62 females taken in the animal bait trap (calf), while only 13 females were taken in the light trap (table 2).

Males of *A. vestitipennis* have not been taken in the light trap as frequently as have males of *A. grabhamii.* A few have been taken in light traps located on both the north and south shores of the Island.

COMPARATIVE ADVANTAGES OF THE LIGHT TRAP AND THE ANIMAL BAIT TRAP

The advantages of the light trap over the animal bait trap in determining anopheline populations may be summarized as follows:

The attraction offered by the light trap may be standardized by the use of a bulb with a given wattage. The animal bait trap cannot be standardized due to a considerable variation in the attraction offered by individual animals of the same or different species.

The light trap collects both sexes, while the animal bait trap attracts only females.

The light trap may be operated with an automatic time switch. The bait trap, on the other hand, requires that an animal be supplied

each time, and considerable labor may be involved in placing it in the trap and removing it.

The light trap catches may be collected at any time during the day, but the bait trap collections must be made early in the morning.

The light trap may be easily moved, while the animal bait trap requires considerable labor to transfer it from place to place. This is particularly important in making anopheline surveys.

There are two significant advantages that the animal bait trap may have over the light trap:

The animal bait trap may be operated in any location while the present light trap must be near a power distribution line, although the use of storage-battery-operated traps might solve this difficulty.

The anophelines may be collected singly from the animal bait trap in a comparatively short time, while much labor may be involved in sorting the anophelines from the host of other night flying insects which gather in the light trap collections.

Because of the ease of manipulation of the light trap and the convenience of collecting the catches, it is generally practical to operate the light trap daily. It is more suitable, however, to operate the animal bait trap only once a week, and this schedule has long been adopted in Puerto Rico. A more immediate check on the control operations is offered by daily collections, and this has proved to be of considerable value. A comparison of the knowledge obtained by daily light trap collections and weekly bait trap collections may be seen in figure 3.

Because of a lack of sufficient distribution of electricity, the animal bait trap undoubtedly will continue to be the most general method for sampling and estimating adult anopheline populations in Puerto Rico. The light trap, however, may be used as a supplementary method where current is available, such as camps and cities in the center of malaria control zones. The combined use of the bait trap and the light trap is sure to give a better evaluation of anopheline populations than is the use of either alone.

SUMMARY

The animal bait trap, employing either a horse or calf, has served with considerable success in Puerto Rico in sampling populations of adult anopheline females.

A. albimanus, the principal vector of malaria on the Island, is attracted to the light trap in considerable numbers. A series of comparative light trap and animal bait trap collections showed the former to be generally superior in the collection of female *A. albimanus*.

A. grabhamii may be attracted in large numbers to the light trap.

Comparative collections indicated, however, that the light trap may not be as favorable for large collections of *A. grabhamii* as is the bait trap. The two types of traps appeared to give similar indexes to abundance when the populations are low.

Comparative collections by light trap and animal bait trap indicate that the light trap more readily collects specimens of *A. vestitipennis* when only a sparse population is present. With greater populations, however, the bait trap may collect the larger numbers.

Males of all three species of Puerto Rican anophelines are taken in light traps.

The light trap is superior to the animal bait trap for evaluating anopheline densities because it may be standardized, it collects both sexes, and it is more easily operated. The animal bait trap is not dependent on a source of electricity as is the light trap and for this reason must continue to be the most generally used method of sampling anopheline populations in Puerto Rico.

II. A List of the Mosquitoes of Puerto Rico

Incidental observations have been made on light trap collections of other species of mosquitoes occurring in Puerto Rico, particularly because of the medical importance of some of these in relation to their transmission of other tropical diseases.

Twenty-nine species of mosquitoes are authenically known to occur in Puerto Rico. Records of six others which were reported by Tulloch (*6*) are open to question. His record for *Anopheles crucians* is based on a single larva which probably was *A. grabhamii*; records for *Aedes nubilis*, *A. condolescens*, and *A. scapularis* are based on material which probably was *A. tortilis*; records for *Wyeomyia mitchellii* probably were based on specimens representing a new species; and the *Culex carcinophilus* record was based on larvae from Lake Cartagena which do not agree with Dyar's types.

Twenty-two species of culicids have been taken in light trap collections on the Island. Six of the other seven species are rare and of local distribution, and light traps have not been operated where they are known to occur. Table 4 lists the species which are authentically known to occur on the Island and indicates the places where they have been taken in light trap collections. Specimens of all species listed from light trap catches have been checked by Dr. Alan Stone and deposited in the National Museum, Washington, D. C.

Although many of the Puerto Rican culicines commonly occur in animal bait traps, no specimens of the genus *Uranotaenia* have been taken, and only rarely have specimens of the genus *Mansonia* been encountered in them. Species of both of these genera are commonly taken in light trap collections.

TABLE 4.—*Mosquitoes of Puerto Rico and their occurrence in U. S. Public Health Service light traps throughout Puerto Rico*

Species	Borinquen Field	Fort Buchanan	Carolina	Ensenada Honda	Losey Field	Camp O'Reilly	Ponce Coast Guard	Salinas	Camp Tortuguero	Vieques Island
Aedes aegypti							x			
Aedes mediovittatus			x							
Aedes sollicitans		x			x					
Aedes taeniorhynchus	x	x	x		x				x	x
Aedes tortilis	x	x	x		x				x	
Anopheles albimanus	x	x	x	x	x	x	x	x	x	x
Anopheles grabhamii	x	x	x	x	x	x		x	x	x
Anopheles vestitipennis		x	x		x			x	x	
Culex americanus										
Culex atratus		x	x		x				x	
Culex bahamensis				x						x
Culex erraticus [1]		x			x				x	
Culex habilitator	x	x	x		x	x			x	x
Culex janitor										
Culex nigripalpus	x	x	x		x	x			x	x
Culex pilosus		x							x	
Culex quinquefasciatus	x	x	x		x	x			x	
Culex secutor										
Deinocerites cancer		x	x	x	x					x
Mansonia indubitans		x							x	
Mansonia titillans	x	x	x			x			x	x
Megarhinus portoricensis										
Orthopodomyia signifera [2]										
Psorophora confinnis	x	x	x		x	x			x	x
Psorophora pygmaea	x	x			x					
Uranotaenia cooki [3]		x								
Uranotaenia lowii	x	x	x		x	x			x	x
Uranotaenia sapphirina		x	x		x					
Weomyia sp.										

[1] *Culex inhibitator* of Tulloch, et al.; *Culex borinqueni* F. M. Root.
[2] First collected in Puerto Rico on El Yunque, at about 2,500 ft. elevation, by Lt Comdr. A. A. Weathersbee, and Lts. H. S. Hurlbut and G. E. Bohart of U. S. Navy, and Capt. T. H. G. Aitken of U. S. Army on Aug. 30, 1942. Larvae, pupal skin, male and female in collection of writers.
[3] First collected in Puerto Rico at Cataño, Dec. 26, 1942, H. D. Pratt and T .H. G. Aitken; later collection Carolina, P. R., June 7, 1943, J. Maldonado Capriles and H. D. Pratt.

REFERENCES

(*1*) Earle, W. C.: *Anopheles grabhamii* (Theobald), a possible vector of malaria. Bol. Assoc. Med. P. R., **28**: 228–232 (1936).

(*2*) Le Prince, Joseph A., and Orenstein, A. J.: Mosquito Control in Panama. G. Putnam's Sons, New York and London, 1916. 335 pp.

(*3*) Magoon, E. H.: A portable stable trap for capturing mosquitoes. Bull. Ent. Res., **26**: 363–372 (1935).

(*4*) Headlee, Thos. J.: Development of mechanical equipment for sampling the mosquito fauna and some results of its use. Proc. 19th Ann. Meet. N. J. Mosq. Exterm. Assoc., 1932. Pp. 106–128.

(*5*) Mulhern, T. D.: New Jersey mechanical trap for mosquito surveys. N. J. Agric. Exper. Sta. Circ. No. 421, 1942. 8 pp.

(*6*) Tulloch, George S.: The mosquitoes of Puerto Rico. J. Agric. Univ. P. R., **21**: 137–168 (1937).

SUSCEPTIBILITY OF THE GOLDEN HAMSTER, *MESOCRICETUS AURATUS*, TO PLAGUE

By MARGARET C. MCMAHON, *Senior Medical Technician in Bacteriology, United States Public Health Service*

The hamster (*Cricetus cricetus*) was reported (*3*) to be infected with plague in southeast Russia in 1926. Three species (*Cricetulus barabensis griseus*—Mongolia; *Cricetulus barabensis barabensis* (*furunculus*)—River Ob, Siberia; *Cricetulus eversmanni*—East Russia) have been found susceptible when the infection is induced artificially but have not been known to be affected in nature. References to the susceptibility of the golden hamster (*Mesocricetus auratus*[1]) to plague have not been found by the author. The habitat of this hamster is recorded as the vicinity of Aleppo, Syria. Aleppo has been the mart for northern Syria, which was the gateway in the Levant from East to West (*2*). This area and those adjoining it have been centers of plague for three thousand years. It is probable that the reference in the Bible (Samuel vi, ver. 5) was the first record in Syria.

Attention was directed to the golden hamster as a possible test animal in routine examinations of field material for the detection of plague because of the readiness with which it breeds in captivity, the rapidity with which a colony can be built through its prolification (as many as twelve are born to a litter), and the facility with which it can be maintained in the laboratory.

In the early months of 1942, a pair was given to this laboratory by the University of California. These were descendants of a shipment from Jerusalem (*4*) received in the summer of 1939 by the International Health Division of the Rockefeller Foundation. In October 1939, six of this colony were brought to California to start a colony at the Influenza Research Laboratory, California State Department of Public Health, Berkeley. In November 1942, the original pair had produced 83, of which 52 were put aside as test stock.

The first test of plague in hamsters was made by inoculating two hamsters with *Pasteurella pestis* from a blood hormone agar slant incubated 48 hours at 30° C. Two guinea pigs, two white mice, and two white rats were inoculated as controls. The strain had just been isolated from a pool of tissue of ground squirrels. One of each pair of animals was given 1 cc. of a saline suspension subcutaneously, and

---

[1] Classification: Order—*Rodentia*; Superfamily—*Muroidae*; Family—*Muridae*; Subfamily—*Cricetinae*; Genus—*Mesocricetus*, Nehring; Species—*Mesocricetus auratus*, Waterhouse—Aleppo, Syria (*5*).

Bruce and Hindle (*1*) give the following description of the golden hamster: It is smaller than the common European hamster, a full-grown female rarely exceeding a length of seven inches, and has a deep, golden-brown color, but toward the roots the hairs are dark grey. The fur is short, soft, and smooth. The ventral surface is very light grey with white patches. The ears are large, grey, and almost naked with a few golden-brown hairs on the outer surfaces. The eyes are large and black. The skin is extremely loose, to such an extent that folds at least two inches deep can be pulled out from any part of the trunk. The short, stumpy tail and especially the feet are lighter in color than the rest of the body. The cheek pouches are well developed and can hold a surprisingly large amount of food.

one each was inoculated by rubbing a loop of the culture and agar into the scarified skin of the abdomen. The pigs, mice, and rats all died of plague within 10 days of inoculation. The two hamsters, still in good health, were killed 31 days later and showed no pathology whatever.

Several tests were then run on 46 hamsters in small groups, using three other strains of *P. pestis*, isolated, respectively, from fleas and tissues of ground squirrels and rats. Two of the strains had been isolated 1 and 2 years previously, and one was recently isolated. Inoculations were subcutaneous, intracutaneous, or intraperitoneal. For subcutaneous or intraperitoneal inoculations, the organisms were grown at 30° or 37° C. for 24 or 48 hours, suspended in saline or broth, and the dosage estimated by a check against turbidity standards. Hamsters received approximately two million to three billion organisms; guinea pigs, one thousand to three billion; and mice, one thousand. For intracutaneous inoculations, a loop of culture on agar together with some of the agar was rubbed into the scarified skin of the abdomen. In one test, the spleen of a guinea pig which had just died of plague was used in place of culture. Similar treatment was given to guinea pigs or mice as controls. All animals were autopsied and examined for evidence of plague.

Of 12 mice inoculated, all died within 6 days and showed plague at autopsy. Twenty-nine guinea pigs out of 30 inoculated died within 11 days and showed plague at autopsy. The one surviving guinea pig was killed 29 days after inoculation and at autopsy showed a scarred spleen and liver, small, hard, inguinal nodes, adhesion of the right upper lobe of lung to the chest wall. No *P. pestis* organisms were found but agglutination tests on the blood serum drawn just before killing showed a titer of 1–160 for plague. Of the 48 hamsters inoculated with different dosages of organisms by one of the three methods, 15 died of plague. Each of these had an advanced peritonitis and evidence of toxic changes in its tissues. They had received the largest doses of culture or of suspension of infected tissue by subcutaneous or intraperitoneal injection. Death occurred within 24 to 72 hours of inoculation and at autopsy the subcutaneous tissues showed evidence of penetration of the abdominal wall either by the needle of inoculation or by sloughing at the site of inoculation. The 33 which survived were killed 20 to 83 days after inoculation and showed no evidence of plague.

Twenty of those injected were bled from the heart just before killing, and agglutination, complement fixation, and mouse protection tests were made. Blood from uninoculated hamsters was used as controls. Serums were collected 26 to 29 days after inoculation with the exception that one was taken on the twentieth day and one was

taken on the forty-sixth day. Agglutination titers of the 20 serums ranged between 0 and 1–64. No agglutination occurred in four, and 1–64 in two. Complement fixation tests were run on 11 of the serums, and titers ranged between 0 and 1–40. No complement fixation occurred in one, and 1–40 in four. Eleven serums were administered by intraperitoneal inoculation of one dose of 0.25 cc. and protected 14 out of 50 mice against subcutaneous inoculation of approximately 200 *P. pestis* in a saline suspension of a 24-hour 30° C. culture on blood hormone agar. Twenty-five (100 percent) controls died when inoculated subcutaneously with the same quantity of organisms. Five normal hamster serums, used as controls in the tests, showed no agglutination, no complement fixation, and no mouse protection, thus showing that an increased immunity had not developed in the hamster as a result of long exposure to the disease in its natural habitat of Syria.

These results indicate that the golden hamster is not a suitable animal for routine use as a test in the diagnosis of plague. On the other hand, it appears from these investigations that it is highly resistant to plague infection when compared with other test animals, but it does not exhibit a natural immunity as determined by serological methods.[2]

REFERENCES

(*1*) Bruce, H. M., and Hindle, E.: The golden hamster, *Cricetus (Mesocricetus) auratus* Waterhouse. Notes on its breeding and growth. Proc. Zool. Soc., London, 1934. Part II, pp. 361–366.

(*2*) Simpson, Wm. J.: A Treatise on Plague. Cambridge University Press, Cambridge, 1905. 466 pp.

(*3*) Wu, Lien-teh, et al.: Plague, A Manual for Medical and Public Health Workers. Chicago Medical Book Co., Chicago, 1936.

(*4*) Personal Communication.

(*5*) Ellerman, J. R.: Rodents other than muridae. (Families and genera of living rodents, by R. W. Hayman and G. W. C. Holt, vol. 1.) Oxford University Press, New York, 1940.

PREVALENCE OF COMMUNICABLE DISEASES IN THE UNITED STATES

January 2–29, 1944

The prevalence of nine important communicable diseases, based on weekly telegraphic reports from State health departments, is summarized in table 1. The reports from each State are published in the PUBLIC HEALTH REPORTS under the section "Prevalence of disease." The table gives the number of cases of these diseases for the 4 weeks ended January 29, 1944, the number reported for the corresponding period in 1943, and the median number for the years 1939–43.

[2] Contrary to these findings on plague, it has been found recently that the golden hamster is readily infected by *Pasteurella tularense* when inoculated intracutaneously with material containing the organism.

TABLE 1.—*Number of reported cases of 9 communicable diseases in the United States during the 4-week period Jan. 2–29, 1944, the number for the corresponding period in 1943, and the median number of cases reported for the corresponding period, 1939–43*

Division	Current period	1943	5-year median	Current period	1943	5-year median	Current period	1943	5-year median
	Diphtheria			Influenza [1]			Measles [2]		
United States	1,059	1,355	1,481	261,885	17,421	17,421	49,851	36,101	36,328
New England	44	13	28	1,252	94	94	3,336	5,064	2,720
Middle Atlantic	93	152	180	505	187	187	9,996	14,088	7,049
East North Central	168	165	233	17,344	571	571	17,474	3,786	3,634
West North Central	94	117	119	14,751	404	404	5,421	2,033	2,033
South Atlantic	179	263	314	67,740	6,163	6,163	5,704	794	2,171
East South Central	83	101	147	41,766	1,244	1,900	2,294	1,059	900
West South Central	195	309	309	89,640	7,362	7,835	1,596	788	883
Mountain	49	77	73	17,912	1,031	1,181	2,149	3,353	2,161
Pacific	154	158	112	10,975	365	738	1,881	5,136	5,136
	Meningococcus meningitis			Poliomyelitis			Scarlet fever		
United States	2,274	1,282	212	119	136	136	17,066	14,150	14,150
New England	193	188	10	4	11	4	1,666	1,968	1,134
Middle Atlantic	559	226	47	10	7	13	3,052	2,732	3.314
East North Central	441	104	21	17	14	16	4,059	4,032	4,229
West North Central	168	99	11	5	14	14	1,942	1,445	1,491
South Atlantic	318	258	46	5	12	18	1,462	1,198	1,198
East South Central	216	82	22	5	10	10	693	581	666
West South Central	143	72	22	24	29	11	484	356	391
Mountain	34	54	8	10	7	7	1,314	929	569
Pacific	202	199	16	39	32	13	2,394	909	909
	Smallpox			Typhoid and paratyphoid fever			Whooping cough [2]		
United States	49	127	190	253	201	315	7,069	15,883	16,857
New England	0	0	0	5	10	13	557	1,894	1,894
Middle Atlantic	0	17	0	16	33	42	1,314	3,992	4,481
East North Central	7	65	64	75	21	44	1,417	3,827	3,827
West North Central	15	7	76	9	14	16	426	722	722
South Atlantic	4	5	5	30	49	55	1,457	1,672	2,082
East South Central	6	9	5	49	9	26	346	536	466
West South Central	6	13	13	36	43	70	655	1,260	482
Mountain	2	5	25	18	12	22	356	538	560
Pacific	9	6	8	15	10	20	541	1,442	1,442

[1] Mississippi, New York, and Pennsylvania excluded, New York City included.
[2] Mississippi excluded

DISEASES ABOVE MEDIAN PREVALENCE

Influenza.—The number of cases of influenza dropped from about 317,000 during the preceding 4-week period to approximately 261,000 cases during the 4 weeks ended January 29. The weekly number declined from 126,610 cases during the week ended January 8 to 22,483 for the week ended January 29, or more than 80 percent. The recent rise of this disease first became perceptible in the East North Central region during the week ended November 13 and spread rapidly east and west into all regions of the country, reaching the Pacific region last, about the middle of December. During the weeks ended January 1 and January 8, there were approximately 126,000 cases reported each week, representing the highest incidence during the recent epidemic.

A comparison with recent years shows that the incidence for the current 4-week period for the country as a whole was 15 times the incidence for the corresponding period in 1943, which figure (17,421 cases) also represents the 1939–43 median for these weeks. Table 2 shows by geographic regions the reported cases of influenza for recent weeks in 1943–44 and corresponding weeks in preceding years. The current weekly incidence is declining in all regions, but each region reported much higher current incidence than occurred during corresponding weeks of 1943. There was only one outbreak of any im-

TABLE 2.—*Influenza cases reported by geographic regions by weeks in 1943 and 1944 and for the corresponding weeks in preceding years* [1]

Geographic area and years	Week ended [2]							
	Dec. 18, 1943	Dec. 25, 1943	Jan. 1, 1944	Jan. 8, 1944	Jan. 15, 1944	Jan. 22, 1944	Jan. 29, 1944	Feb. 5, 1944
46 States, [3] District of Columbia, and New York City:								
1943–44	82,951	83,973	126,481	126,610	65,649	47,143	22,483	14,912
1942–43	2,414	2,290	3,440	3,852	4,330	4,387	4,852	4,327
1941–42	2,995	2,693	2,587	3,800	3,894	4,332	4,899	5,667
1940–41	29,864	42,457	45,475	77,144	89,828	120,006	96,652	72,578
New England:								
1943–44	344	929	1,019	560	227	328	137	130
1942–43	4	3	11	63	4	13	14	17
1941–42	7	1	1	9	3	3	1	3
1940–41	13	8	25	149	2,563	4,236	3,103	998
Middle Atlantic:								
1943–44	564	889	526	225	141	80	59	53
1942–43	23	25	42	51	50	46	40	27
1941–42	21	20	27	26	24	21	31	33
1940–41	23	45	38	97	124	310	899	2,211
East North Central:								
1943–44	5,620	10,236	11,132	8,959	5,766	1,712	907	410
1942–43	114	55	103	123	185	150	113	155
1941–42	71	72	88	148	99	102	131	139
1940–41	305	1,058	358	396	1,151	3,975	4,490	8,120
West North Central:								
1943–44	6,639	14,087	7,647	5,749	3,087	5,588	327	266
1942–43	51	40	18	125	90	130	59	84
1941–42	63	26	33	65	38	46	27	66
1940–41	76	336	1,867	2,771	3,814	2,882	2,702	3,582
South Atlantic:								
1943–44	15,920	16,425	35,971	32,635	19,459	10,209	5,437	3,953
1942–43	798	691	1,224	1,561	1,557	1,595	1,450	1,537
1941–42	732	664	515	979	978	1,202	1,338	1,519
1940–41	864	779	1,706	4,308	13,629	46,255	50,310	41,106
East South Central:								
1943–44	35,425	4,775	29,266	28,945	6,117	4,176	2,528	1,306
1942–43	85	217	237	197	343	201	503	293
1941–42	165	98	121	251	379	535	735	837
1940–41	195	458	1,710	11,536	12,870	15,282	13,021	7,377
West South Central:								
1943–44	9,029	15,652	25,686	37,332	23,736	19,069	9,503	6,696
1942–43	995	907	1,465	1,419	1,816	1,929	2,198	1,887
1941–42	1,661	1,517	1,455	1,906	1,893	1,885	2,151	2,374
1940–41	1,763	12,796	19,516	44,982	45,480	39,392	17,655	10,560
Mountain:								
1943–44	5,975	11,911	7,774	7,169	4,006	4,017	2,720	1,611
1942–43	276	245	289	262	189	230	350	210
1941–42	164	177	269	285	287	361	248	482
1940–41	11,600	8,455	9,566	7,581	6,634	4,623	2,861	2,818
Pacific:								
1943–44	3,435	9,069	7,460	5,036	3,110	1,964	865	487
1942–43	68	47	51	51	96	93	125	117
1941–42	111	118	78	131	193	177	237	214
1940–41	15,025	18,522	10,680	5,824	3,563	3,051	1,611	1,306

[1] Similar tables appeared in Public Health Reports for Dec. 24, 1943, p. 1893, and Jan. 21, 1944, p. 81.
[2] First week of year is the one ended Jan. 4 to 10, inclusive, with corresponding weeks counted from that base.
[3] New York State and Mississippi excluded; New York City included.

portance during the last 5 years. The median number of cases for this 4-week period in the epidemic years of 1941, 1937, 1933, and 1929 was approximately 267,000, or slightly above the current incidence of 262,000 cases.

Reports for the week ended February 5 show a further drop of more than 30 percent in the number of cases, approximately 15,000 as compared with 22,483 for the last week of this 4-week period. All sections of the country participated in this decline.

Mortality data from the Bureau of the Census (table 3) indicate that deaths from all causes have declined in all sections to approximately normal rates for this season of the year.

TABLE 3.—*Weekly and total excess death rates from all causes in 90 cities in different geographic sections of the United States, during the influenza epidemic of 1943–44* [1]

Geographic section	Week ended—									Total excess death rate (actual) per 100,000 during 11 weeks [3]
	Dec. (1943)			Jan. (1944)					Feb. (1944)	
	11	18	25	1	8	15	22	29	5	
	Weekly excess [2] death rate from all causes per 1,000 (annual basis)									
All cities	+1.7	+3.5	+4.7	+6.4	+4.5	+2.0	+0.7	+0.4	−0.1	48.7
New England	+1.3	+3.0	+5.3	+7.8	+7.2	+4.8	0	+1.0	−1.0	61.2
Middle Atlantic	+2.3	+4.3	+7.4	+8.1	+5.2	+1.9	+.8	+.3	−.5	61.3
East North Central	+1.8	+2.0	+3.0	+5.3	+4.1	+1.3	+.6	0	−.2	38.8
West North Central	+2.6	+7.2	+4.9	+5.2	+2.4	+1.5	−.4	+.2	+1.0	51.7
South Atlantic	+1.3	+3.4	+4.4	+8.3	+2.7	+2.0	+.6	+1.0	−.3	48.7
East South Central	+1.3	+3.1	+1.7	+5.8	+4.2	+2.5	+2.0	+2.5	+1.3	51.2
West South Central	+1.1	+1.5	+2.8	+5.3	+3.7	+4.3	+3.2	+.7	+1.1	49.4
Mountain	+2.3	+5.6	+3.8	+5.0	+1.8	+.9	−.6	−2.2	+1.8	44.6
Pacific	+.3	+.9	+1.9	+3.3	+4.5	+1.4	+.5	+.7	+.5	28.5

[1] Computed from data in Weekly Mortality Index of the U. S. Bureau of the Census. For similar data for earlier weeks see Public Health Reports, Jan 21, 1944, p. 81.
[2] Excess over 3-week moving average of average of rates for corresponding weeks of 1941–42 and 1942–43.
[3] Nov. 21, 1943, to Feb. 5, 1944.

For the whole group of 90 large cities, the mortality from all causes in excess of the normal expectancy during the 11 weeks from November 21 to February 5 amounted to 49 per 100,000 population. This figure may be compared with total excess rates from all causes for a group of 35 large cities of 65 per 100,000 for the epidemic of 1928–29; 48 for that of 1926; 50 for that of 1923; 34 for that of 1922; 125 for the epidemic of 1920; and 598 for the pandemic of 1918–19. Comparable data are not available for the several epidemics since 1930, but they were all smaller than those of 1928–29, 1926, and 1923. During the peak week ended January 1, 1944, the excess mortality from all causes in the current epidemic was larger than in the peak week of the epidemic of 1928–29, but the total excess during the whole epidemic was considerably smaller, 49 as compared with 65 per 100,000 for 1928–29. Thus the current outbreak was larger than any epidemic since 1928–29, but caused only about 8 percent as

many excess deaths in the United States as the 1918 pandemic. In the current epidemic the highest total excess rates occurred in the New England and Middle Atlantic cities, and the lowest in the Pacific cities.

Measles.—The number of cases of measles rose from approximately 30,000 during the preceding 4 weeks to approximately 50,000 during the 4 weeks ended January 29, which figure represents an increase of about 40 percent over the 1939–43 median. Each section of the country except the Mountain and Pacific contributed to this relatively high incidence. In the former region the number of cases was about normal, but in the latter region the number of cases (1,881) was only about 35 percent of the median. The greatest increase over the normal seasonal expectancy was reported from the East North Central region; the number of cases occurring there was about 5 times the median. An increase of this disease is normally expected at this season of the year and while the incidence is the highest for this period since 1938, the rate of increase is about normal.

Meningococcus meningitis.—The incidence of this disease continued at a relatively high level, the 2,274 cases reported for the 4 weeks ended January 29 being considerably above even the previous year, when 1,282 cases were reported for the corresponding period. The Mountain region alone reported fewer cases than during the corresponding period in 1943. Compared with the medians, the incidence for the country as a whole was almost 11 times the median while in the various regions the increases ranged from more than 4 times the median in the Mountain region to 21 times the median in the East North Central region.

While the figures remain relatively high, for the country as a whole there was an increase during the current period over the preceding 4-week period of about 63 percent, as compared with an increase of 165 percent during the corresponding period in 1943 over its preceding period. In 1942 when no special epidemic was in progress the incidence increased about 60 percent during the first 4 weeks of the year over the preceding 4-week period.

While the disease appears to be most prevalent in the North Atlantic and East South Central regions, every section has contributed to the current high incidence. States in which the disease is unusually prevalent are: New York, 288 cases; Pennsylvania, 171; Ohio, 152; California, 142; Tennessee, 107; Illinois, 104; New Jersey, 100; Massachusetts, 97; Michigan and Missouri, 89 each; Texas, 82; and Virginia, 73 cases—1,500 of the 2,274 cases in the whole country occurred in these 12 States.

Scarlet fever.—For the 4 weeks ended January 29 there were 17,066 cases of scarlet fever reported, as compared with 14,150, 13,722, and 12,674 for the corresponding period in 1943, 1942, and 1941, respec-

tively. The 1939–43 median was 14,150 cases. Of the nine geographic regions only two, the Middle Atlantic and East North Central, reported fewer cases than might normally be expected during this period of the year. In the Pacific region the number of cases (2,394) was 2.6 times the median while in the Mountain region the number (1,314) was 2.3 times the median; other regions reported minor increases.

States that reported the largest increases over the preceding 5-year median were: California, 1,255 cases (median 618); District of Columbia; 275 cases (median 61); Oregon, 318 cases (median 70); Utah, 727 cases (median 90); Washington 821 cases (median 147). For the country as a whole the rate of increase during the current 4-week period over the preceding 4-week period (39 percent) was considerably larger than normally occurs at this season of the year. The rate of increase during the corresponding period in 1943 over its preceding period was about 29 percent, while the average rate of increase in the 3 preceding years was only about 13 percent.

DISEASES BELOW MEDIAN PREVALENCE

Diphtheria.—For the 4 weeks ended January 29 there were 1,059 cases of diphtheria reported, as compared with 1,355 for the corresponding period in 1943 and with a preceding 5-year median of 1,481 cases. In the New England and Pacific regions the numbers of cases were higher than the medians, but in all other regions the incidence was considerably below the normal seasonal level.

Poliomyelitis.—The incidence of this disease was comparatively low, 119 cases being reported for the current period, as compared with 136 for the corresponding period in 1943. The 1939–43 median was represented by the 1943 figure. In the Pacific region the number of cases (39) was 3 times the median, and in the West South Central region the number (24) was more than 2 times the median; in other regions the incidence either closely approximated the 1939–43 median or fell considerably below it.

Smallpox.—For this disease the current incidence was the lowest on record for this period of the year. The total of 49 cases reported was less than 40 percent of the 1943 figure for the corresponding period and it was about 25 percent of the 1939–43 median. The situation was favorable in all sections of the country.

Typhoid and paratyphoid fever.—The number of cases (253) of typhoid and paratyphoid fever was slightly above the number reported for the corresponding period in 1943, but it was only about 80 percent of the 1939–43 median. During the last week of the current period (ended January 29) there were 32 cases of typhoid reported from the north central part of Indiana. The cases were scattered over several counties, no county reporting more than 6 cases. The

outbreak that occurred in Kentucky during the last week of December and continued during the first 2 weeks of the current 4-week period apparently was over as there were no cases reported during the last week of the period.

Whooping cough.—The incidence of whooping cough was the lowest reported for this period in 7 years. For the 4 weeks ended January 29 there were 7,069 cases, as compared with 15,883 in 1943 and a preceding 5-year median of 16,857 cases. The West South Central region reported only about one-half of the number of cases that occurred in that region in 1943, but the current figure was slightly above the median. In all other regions the incidence was lower than for the corresponding period in 1943, as well as considerably below the 5-year median.

MORTALITY, ALL CAUSES

For the fourth week deaths in large cities of the United States have declined from the high level reached during the influenza epidemic. By weeks the deaths in the 90 large cities for the 4 weeks ended January 29 were 13,322, 11,538, 10,359, and 9,454 respectively. A further discussion of mortality in large cities is found under the subject of influenza.

DEATHS DURING WEEK ENDED FEBRUARY 5, 1944

[From the Weekly Mortality Index, issued by the Bureau of the Census, Department of Commerce]

	Week ended Feb. 5, 1944	Corresponding week, 1943
Data for 89 large cities of the United States:		
Total deaths	9,455	10,021
Average for 3 prior years	9,736	
Total deaths, first 5 weeks of year	54,497	51,182
Deaths under 1 year of age	645	676
Average for 3 prior years	582	
Deaths under 1 year of age, first 5 weeks of year	3,212	3,646
Data from industrial insurance companies:		
Policies in force	66,262,379	65,324,607
Number of death claims	14,931	13,741
Death claims per 1,000 policies in force, annual rate	11.8	11.0
Death claims per 1,000 policies, first 5 weeks of year, annual rate	12.5	11.1

PREVALENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED FEBRUARY 12, 1944

Summary

Notwithstanding a slight reduction, the incidence of meningococcus meningitis continued high. A total of 562 cases was reported, as compared with 571 last week, 446 for the corresponding week last year, and a 5-year (1939–43) median of 46.

Ten States reporting an aggregate of 341 cases, or 60 percent of the total, are as follows (last week's figures in parentheses): *Increases*—New Jersey 28 (17), Pennsylvania 37 (35), Illinois 39 (29), Michigan 33 (31), Tennessee 28 (13), Mississippi 24 (7); *decreases*—New York 57 (64), Ohio 27 (29), Texas 24 (29), California 44 (49). The cumulative total to date is 3,407 as compared with 2,058 for the same period last year and a 5-year median of 323.

A current total of 5,803 cases of scarlet fever was reported, as compared with 5,365 last week and a 5-year median of 3,823. The cumulative total, 28,234, is 28 percent higher than the corresponding 5-year median.

A total of 23,220 cases of measles was reported, of which 18,420, or 79 percent, occurred in the Middle Atlantic, North Central, and South Atlantic States. The cumulative total to date, 91,719 cases, is 47 percent higher than the corresponding 5-year median.

Of a total of 111 cases of typhoid fever reported during the week, 64 occurred in Indiana, where an outbreak, according to a preliminary report, has been attributed to cheddar cheese. Fourteen cases of smallpox, with 1 death, have been reported recently in Fresno County, California.

Figures for diphtheria, poliomyelitis, smallpox, and whooping cough, both current and cumulative, are below both the corresponding figures for last year and the 5-year medians.

Deaths in 89 large cities of the United States totaled 9,249, as compared with 9,408 last week and a 3-year (1941–43) average of 9,479. The cumulative total to date is 63,371, as compared with 60,565 for the same period last year.

Telegraphic morbidity reports from State health officers for the week ended February 12, 1944, and comparison with corresponding week of 1943 and 5-year median

In these tables a zero indicates a definite report, while leaders imply that, although none was reported, cases may have occurred.

Division and State	Diphtheria			Influenza			Measles			Meningitis, meningococcus		
	Week ended—		Median 1939–43	Week ended—		Median 1939–43	Week ended—		Median 1939–43	Week ended—		Median 1939–43
	Feb. 12, 1944	Feb. 13, 1943		Feb 12, 1944	Feb. 13, 1943		Feb. 12, 1944	Feb. 13, 1943		Feb. 12, 1944	Feb. 13, 1943	
NEW ENGLAND												
Maine	1	0	0	------	------	1	240	13	70	5	4	0
New Hampshire	0	0	0	------	------	------	1	8	8	6	2	1
Vermont	0	0	0	32	1	------	75	280	10	0	0	0
Massachusetts	10	4	3	------	------	------	415	562	432	9	19	1
Rhode Island	0	0	0	28	2	------	375	59	59	3	19	0
Connecticut	2	0	0	9	4	8	207	367	177	8	5	0
MIDDLE ATLANTIC												
New York	9	14	22	[1] 14	[1] 19	[1] 36	1,6[illegible]	1,272	1,246	57	43	3
New Jersey	2	6	8	20	12	29	1,277	733	167	28	26	2
Pennsylvania	9	9	24	12	3	------	2,038	2,481	1,083	37	25	7
EAST NORTH CENTRAL												
Ohio	9	13	13	38	7	16	4,144	126	126	27	2	2
Indiana	2	4	11	27	15	44	240	244	57	9	3	0
Illinois	13	12	19	44	9	134	799	323	230	39	5	0
Michigan [2]	4	2	3	7	2	2	1,410	215	251	33	7	0
Wisconsin	1	0	1	369	50	65	1,456	616	585	5	9	1
WEST NORTH CENTRAL												
Minnesota	4	0	3	3	1	1	1,107	28	359	4	2	0
Iowa	4	0	3	52	------	9	570	114	114	2	0	0
Missouri	6	6	6	7	1	33	158	253	74	17	11	1
North Dakota	0	0	2	24	1	32	158	0	13	1	1	0
South Dakota	0	5	4	8	------	4	73	87	18	1	0	0
Nebraska	1	2	1	9	2	2	11	125	31	2	0	0
Kansas	5	2	6	2	14	14	268	185	185	5	5	1
SOUTH ATLANTIC												
Delaware	1	0	1	------	------	------	22	16	1	0	0	0
Maryland [2]	1	4	6	95	9	103	516	35	61	7	12	2
District of Columbia	0	0	0	3	3	5	72	88	19	2	6	0
Virginia	8	5	10	1,421	903	553	571	173	148	13	61	1
West Virginia	3	3	7	88	18	43	380	21	23	0	2	1
North Carolina	9	11	16	33	36	36	850	32	182	11	7	2
South Carolina	5	1	6	1,109	733	784	236	46	46	13	21	2
Georgia	3	8	8	267	169	169	357	131	128	7	3	1
Florida	6	3	4	40	3	3	86	29	41	18	4	0
EAST SOUTH CENTRAL												
Kentucky	10	6	6	545	9	51	47	614	108	13	5	3
Tennessee	7	4	9	366	112	112	350	96	64	28	6	3
Alabama	11	2	5	448	227	536	446	38	198	17	20	2
Mississippi [2]	2	4	4	------	------	------	------	------	------	24	4	3
WEST SOUTH CENTRAL												
Arkansas	7	13	8	397	166	293	113	146	112	9	3	1
Louisiana	13	8	8	73	7	23	41	92	92	17	11	2
Oklahoma	1	8	8	358	164	207	57	87	87	4	1	1
Texas	40	40	40	3,403	1,923	1,923	649	324	324	24	16	2
MOUNTAIN												
Montana	0	2	2	59	51	42	121	160	96	1	0	0
Idaho	0	0	1	14	2	------	10	402	106	1	1	0
Wyoming	0	0	0	18	53	53	56	69	62	2	1	0
Colorado	6	9	9	134	55	55	380	287	85	0	1	0
New Mexico	1	4	2	1	5	7	36	28	51	1	2	0
Arizona	6	0	2	366	155	155	191	18	18	0	3	0
Utah [2]	0	0	0	482	314	66	18	360	131	2	9	0
Nevada	0	0	0	7	1	------	4	18	0	0	0	0
PACIFIC												
Washington	3	2	2	19	1	1	153	754	208	3	15	0
Oregon	3	1	1	67	15	40	112	276	247	3	11	0
California	22	62	22	230	99	137	703	372	433	44	33	3
Total	250	279	308	10,748	5,376	5,376	23,220	12,803	12,954	[a] 562	446	46
6 weeks	1,565	1,919	2,109	287,641	27,124	27,772	91,719	62,348	62,348	3,407	2,058	823

See footnotes at end of table.

Telegraphic morbidity reports from State health officers for the week ended February 12, 1944, and comparison with corresponding week of 1943 and 5-year median—Con.

Division and State	Poliomyelitis			Scarlet fever			Smallpox			Typhoid and paratyphoid fever [3]		
	Week ended—		Median 1939–43	Week ended—		Median 1939–43	Week ended—		Median 1939–43	Week ended—		Median 1939–43
	Feb. 12, 1944	Feb. 13, 1943		Feb. 12, 1944	Feb. 13, 1943		Feb. 12, 1944	Feb. 13, 1943		Feb. 12, 1944	Feb. 13, 1943	
NEW ENGLAND												
Maine	0	0	0	23	1	19	0	0	0	0	0	0
New Hampshire	0	0	0	26	9	9	0	0	0	0	0	0
Vermont	0	0	0	17	18	8	0	0	0	0	0	0
Massachusetts	0	0	0	373	506	255	0	0	0	1	2	1
Rhode Island	0	0	0	25	21	10	0	0	0	0	0	0
Connecticut	1	0	0	66	59	59	0	0	0	0	0	0
MIDDLE ATLANTIC												
New York	1	0	2	761	473	473	0	0	0	1	0	5
New Jersey	0	1	0	224	130	172	0	0	0	1	0	0
Pennsylvania	0	0	0	419	303	367	0	0	0	6	6	6
EAST NORTH CENTRAL												
Ohio	0	0	0	259	285	296	0	0	0	3	1	1
Indiana	0	0	0	85	97	160	1	9	6	64	0	2
Illinois	0	1	0	316	186	454	1	1	1	1	1	2
Michigan [2]	0	2	1	230	150	253	0	0	2	1	2	1
Wisconsin	0	1	1	295	256	208	0	0	5	1	0	0
WEST NORTH CENTRAL												
Minnesota	0	0	0	198	40	93	0	0	4	0	0	0
Iowa	0	2	2	167	83	70	1	0	3	1	1	0
Missouri	2	0	0	95	97	91	1	0	2	2	0	1
North Dakota	0	0	0	32	15	16	0	0	[illegible]	1	0	0
South Dakota	0	1	0	45	19	21	0	0	0	0	1	0
Nebraska	0	1	0	52	31	31	0	1	0	0	0	0
Kansas	1	0	0	95	84	84	0	2	1	0	0	0
SOUTH ATLANTIC												
Delaware	0	0	0	6	8	8	0	0	0	0	1	0
Maryland [2]	0	0	0	192	81	81	0	0	0	0	0	1
District of Columbia	1	0	0	231	28	18	0	0	0	0	1	1
Virginia	0	2	0	75	37	46	0	0	0	1	2	2
West Virginia	2	1	0	35	39	39	0	0	0	2	0	0
North Carolina	0	0	0	48	41	48	0	0	0	1	2	2
South Carolina	0	0	0	5	16	6	0	1	0	1	0	2
Georgia	0	1	0	21	31	25	0	1	0	4	3	8
Florida	0	1	1	22	11	11	1	0	0	0	0	2
EAST SOUTH CENTRAL												
Kentucky	0	1	0	83	65	78	0	0	0	0	1	3
Tennessee	2	1	1	53	48	48	1	0	0	0	0	2
Alabama	1	1	1	22	25	24	0	0	0	1	2	2
Mississippi [2]	0	0	1	10	16	5	1	0	1	2	2	1
WEST SOUTH CENTRAL												
Arkansas	0	1	1	4	7	7	0	4	2	1	2	3
Louisiana	1	0	0	7	6	6	0	0	0	8	3	3
Oklahoma	0	0	0	48	32	31	0	5	1	1	2	1
Texas	1	4	1	65	62	62	2	4	4	8	2	6
MOUNTAIN												
Montana	0	0	0	78	17	25	0	0	0	0	1	1
Idaho	0	0	0	54	18	18	0	0	1	0	0	0
Wyoming	0	0	0	5	54	8	0	0	0	0	0	0
Colorado	0	0	0	72	23	37	0	0	6	2	0	0
New Mexico	0	0	0	0	5	8	2	0	0	0	1	3
Arizona	0	0	0	21	9	9	0	0	1	1	0	0
Utah [2]	0	0	0	120	75	31	0	0	0	0	2	0
Nevada	0	0	0	0	5	0	0	0	0	0	0	0
PACIFIC												
Washington	2	0	0	268	33	45	0	0	0	0	0	1
Oregon	1	1	0	90	9	18	0	0	0	0	0	1
California	2	5	2	365	159	140	[4] 0	0	1	0	2	4
Total	18	28	21	5,803	3,823	3,823	[4] 11	28	53	111	43	72
6 weeks	159	192	186	28,234	22,010	22,010	80	183	301	495	292	475

See footnotes at end of table.

Telegraphic morbidity reports from State health officers for the week ended February 12, 1944, and comparison with corresponding week of 1943 and 5-year median—Con.

Division and State	Whooping cough			Week ended Feb. 12, 1944								
	Week ended—		Median 1939–43	Anthrax	Dysentery			Encephalitis, infectious	Leprosy	Rocky Mt. spotted fever	Tularemia	Typhus fever
	Feb. 12, 1944	Feb. 13, 1943			Amebic	Bacillary	Unspecified					
NEW ENGLAND												
Maine	14	40	40	0	0	0	0	0	0	0	0	0
New Hampshire	3	12	4	0	0	0	0	0	0	0	0	0
Vermont	31	11	26	0	0	0	0	0	0	0	0	0
Massachusetts	114	151	220	0	0	9	0	0	0	0	0	0
Rhode Island	5	21	21	0	0	1	0	0	0	0	0	9
Connecticut	23	52	64	0	0	0	0	0	0	0	0	0
MIDDLE ATLANTIC												
New York	112	328	394	0	0	7	0	3	0	0	0	0
New Jersey	71	145	145	0	2	0	1	0	0	0	0	0
Pennsylvania	104	319	341	1	0	0	0	0	0	0	0	0
EAST NORTH CENTRAL												
Ohio	53	194	216	0	0	0	0	0	0	0	0	0
Indiana	8	24	24	0	0	0	0	0	0	0	0	0
Illinois	67	174	158	0	0	2	0	0	0	0	0	0
Michigan [2]	106	351	189	0	0	2	0	0	0	0	0	0
Wisconsin	102	182	182	0	0	0	0	0	0	0	0	0
WEST NORTH CENTRAL												
Minnesota	31	71	56	0	0	0	0	0	0	0	0	0
Iowa	15	20	24	0	0	0	0	0	0	0	0	0
Missouri	13	20	20	0	0	0	0	0	0	0	0	0
North Dakota	5	3	13	0	0	0	0	1	0	0	0	0
South Dakota	0	3	8	0	0	0	0	0	0	0	0	0
Nebraska	4	10	10	0	0	0	0	0	0	0	0	0
Kansas	45	39	55	0	0	6	0	0	0	0	0	0
SOUTH ATLANTIC												
Delaware	0	0	4	0	0	0	0	0	0	0	0	0
Maryland [2]	47	60	60	0	0	0	2	0	0	0	1	0
District of Columbia	6	17	17	0	0	0	0	0	0	0	0	0
Virginia	49	149	70	0	0	0	25	0	0	0	1	0
West Virginia	31	90	43	0	0	0	0	0	0	0	0	0
North Carolina	160	92	148	0	0	0	0	0	0	0	1	1
South Carolina	76	24	45	0	0	6	0	0	0	0	0	2
Georgia	14	24	24	0	0	0	0	0	0	0	1	8
Florida	12	15	17	0	0	1	2	0	0	0	0	2
EAST SOUTH CENTRAL												
Kentucky	50	38	38	0	0	0	0	0	0	0	0	0
Tennessee	33	83	41	0	0	0	3	1	0	1	2	2
Alabama	12	15	21	0	0	0	0	1	0	0	0	10
Mississippi [2]	---	---	-----	0	0	0	0	0	0	0	0	0
WEST SOUTH CENTRAL												
Arkansas	23	63	11	0	1	0	0	0	0	0	0	0
Louisiana	1	8	8	0	2	0	0	0	0	0	0	6
Oklahoma	16	16	6	0	0	0	0	1	0	0	0	0
Texas	181	382	172	0	2	147	0	2	0	0	0	20
MOUNTAIN												
Montana	12	33	13	0	0	0	0	0	0	0	0	0
Idaho	4	3	5	0	0	0	0	0	0	0	0	0
Wyoming	35	0	2	0	0	0	0	0	0	0	0	0
Colorado	35	15	36	0	0	0	0	0	0	0	0	0
New Mexico	3	22	22	0	0	0	0	0	0	0	0	0
Arizona	39	16	16	0	4	0	17	1	0	0	0	0
Utah [2]	25	33	41	0	1	0	0	0	0	0	0	0
Nevada	2	1	0	0	0	0	0	0	0	0	0	0
PACIFIC												
Washington	42	27	31	0	0	0	0	0	0	0	0	0
Oregon	32	5	13	0	0	0	0	0	0	0	0	0
California	56	269	244	0	0	5	0	0	0	0	0	0
Total	1,922	3,670	3,816	1	12	186	50	10	0	1	6	51
6 weeks	11,045	23,409	25,517	5	129	1,385	320	54	3	1	71	209
6 weeks, 1943	------	------	------	10	106	1,011	237	56	4	1	121	362

[1] New York City only.
[2] Period ended earlier than Saturday.
[3] Including paratyphoid fever cases reported separately as follows: New York, 1; Georgia, 1.
[4] Exclusive of delayed reports (included only in cumulative total) of 7 cases in California.

WEEKLY REPORTS FROM CITIES

City reports for week ended January 29, 1944

This table lists the reports from 88 cities of more than 10,000 population distributed throughout the United States, and represents a cross section of the current urban incidence of the diseases included in the table.

	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
NEW ENGLAND												
Maine:												
Portland	0	0	-----	0	3	2	4	0	11	0	2	0
New Hampshire:												
Concord	0	0	------	0	0	0	1	0	1	0	0	0
Vermont:												
Barre	0	0	7	0	0	0	0	0	0	0	0	0
Massachusetts:												
Boston	1	0	------	0	32	6	20	0	61	0	0	16
Fall River	0	0	------	0	1	0	1	0	11	0	0	2
Springfield	0	0	------	0	60	0	3	0	21	0	0	6
Worcester	0	0	-----	0	6	0	14	0	76	0	0	4
Rhode Island:												
Providence	0	0	2	0	175	2	6	0	4	0	0	2
Connecticut:												
Bridgeport	0	0	------	0	3	0	0	3	5	0	0	0
Hartford	1	0	------	1	1	0	1	0	16	0	0	0
New Haven	0	0	------	0	23	2	2	0	7	0	0	1
MIDDLE ATLANTIC												
New York:												
Buffalo	1	0	-	4	6	1	8	0	8	0	0	2
New York	4	0	15	5	691	40	116	0	27	0	1	30
Rochester	0	0	--	1	0	0	5	0	5	0	0	8
Syracuse	1	0	-	0	1	3	1	0	5	0	0	4
New Jersey:												
Camden	1	0	2	1	1	2	1	0	17	0	0	2
Newark	0	0	2	0	32	5	6	0	19	0	0	3
Trenton	0	0	1	0	1	1	5	0	13	0	0	0
Pennsylvania:												
Philadelphia	2	0	20	16	12	21	53	0	38	0	0	16
Pittsburgh	0	0	5	4	297	5	18	0	15	0	0	2
Reading	0	0	------	0	2	0	4	0	2	0	0	2
EAST NORTH CENTRAL												
Ohio:												
Cincinnati	5	0	6	2	11	6	5	0	22	0	0	5
Cleveland	0	0	10	1	353	6	12	0	69	0	3	17
Columbus	0	0	10	6	54	1	6	0	7	0	0	5
Indiana:												
Fort Wayne	0	0	------	4	48	0	5	0	3	0	0	0
Indianapolis	2	0	------	4	16	2	6	0	39	1	0	11
South Bend	0	0	------	0	8	0	0	0	1	0	0	0
Terre Haute	0	0	------	0	0	1	0	0	0	0	0	0
Illinois:												
Chicago	0	0	5	3	36	10	33	1	99	0	0	39
Springfield	0	0	------	0	22	0	3	0	2	0	0	0
Michigan:												
Detroit	3	0	3	3	26	13	15	0	62	0	0	16
Flint	0	0	------	1	0	0	7	0	3	0	0	1
Grand Rapids	0	0	----	0	140	0	1	0	14	0	0	0
Wisconsin:												
Kenosha	0	0	--	0	0	0	0	0	1	0	0	0
Milwaukee	0	0	3	3	17	1	8	0	71	0	0	23
Racine	0	0	------	0	3	0	1	0	10	0	0	11
Superior	0	0	------	1	33	0	2	0	2	0	0	0
WEST NORTH CENTRAL												
Minnesota:												
Duluth	0	0	------	0	5	1	2	0	14	0	0	8
Minneapolis	5	0	------	1	260	1	7	0	39	0	0	8
St. Paul	0	1	------	1	152	0	9	0	32	0	0	7
Missouri:												
Kansas City	0	0	------	2	3	4	5	0	33	0	0	0
St. Joseph	0	0	------	0	0	1	0	0	1	0	0	0
St. Louis	1	0	1	2	40	18	12	0	11	0	0	4
North Dakota:												
Fargo	0	0	------	0	37	0	1	0	1	0	0	0

City reports for week ended January 29, 1944—Continued

	Diphtheria cases	Encephalitis, infectious, cases	Influenza Cases	Influenza Deaths	Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
WEST NORTH CENTRAL—continued												
Nebraska:												
Omaha	3	0		0	3	0	1	0	18	0	0	0
Kansas:												
Topeka	0	0		3	0	0	3	0	3	0	0	9
Wichita	1	0		0	82	2	4	0	3	0	0	0
SOUTH ATLANTIC												
Delaware:												
Wilmington	0	0		1	7	1	1	0	1	0	0	0
Maryland:												
Baltimore	10	0	9	5	165	4	17	0	45	0	0	14
Cumberland	0	0		0	1	0	0	0	2	0	0	0
Frederick	0	0		0	1	0	0	0	0	0	0	0
District of Columbia:												
Washington	3	0	5	1	60	3	16	0	131	0	0	5[1]
Virginia:												
Lynchburg	0	0	42	0	5	1	1	0	0	0	1	0
Richmond	0	0	6	6	28	0	5	0	1	0	0	3
Roanoke	0	0		0	56	0	1	0	1	0	0	4
West Virginia:												
Charleston	0	0		0	1	0	0	0	3	0	0	0
Wheeling	0	0		0	2	0	2	0	1	0	0	0
North Carolina												
Winston-Salem	2	0		0	57	0	1	0	0	0	0	0
South Carolina:												
Charleston	0	0	38	0	12	6	4	0	2	0	0	0
Georgia:												
Atlanta	0	0	61	7	25	2	6	0	5	0	0	0
Savannah	0	0	12	7	1	1	4	0	2	0	0	0
Florida:												
Tampa	0	0		0	4	0	3	0	1	0	0	0
EAST SOUTH CENTRAL												
Tennessee:												
Memphis	0	0	20	3	0	4	10	0	3	0	0	9
Nashville	0	0		4	1	3	7	0	4	0	0	0
Alabama:												
Birmingham	0	0	29	2	21	1	4	0	3	0	0	0
Mobile	1	0	61	2	5	0	5	0	0	0	0	1
WEST SOUTH CENTRAL												
Arkansas:												
Little Rock	0	0	10	1	3	0	3	0	0	0	0	2
Louisiana:												
New Orleans	1	0	42	3	13	8	10	0	7	0	0	1
Shreveport	1	0		2	0	0	8	0	0	0	1	0
Texas:												
Dallas	0	0	3	3	15	2	3	0	2	0	0	0
Galveston	0	0	89	0	0	0	4	0	3	0	0	0
Houston	0	0		1	3	2	11	0	2	0	0	0
San Antonio	1	0	3	2	1	6	7	1	0	0	0	0
MOUNTAIN												
Montana:												
Billings	0	0		1	3	0	0	0	1	0	0	0
Great Falls	0	0	67	1	11	0	1	0	3	0	0	7
Helena	0	0		0	0	0	0	0	3	0	0	0
Missoula	0	0	1	1	1	0	1	0	3	0	0	0
Idaho:												
Boise	0	0	75	0	0	0	0	0	0	0	0	0
Colorado:												
Denver	3	0	7	2	52	1	6	1	29	0	0	19
Pueblo	0	0		0	68	0	3	0	1	0	0	2
Utah:												
Salt Lake City	0	0		1	2	0	1	0	28	0	0	2
PACIFIC												
Washington:												
Seattle	0	0		0	6	0	10	0	18	0	0	9
Spokane	0	0		0	55	1	1	0	24	0	0	0
Tacoma	0	0		0	10	0	1	0	88	0	0	0

City reports for week ended January 29, 1944—Continued

	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
PACIFIC—continued												
California:												
Los Angeles	7	0	108	8	99	5	8	2	47	0	1	5
Sacramento	1	0	1	1	2	1	2	0	2	0	0	0
San Francisco	2	0	22	1	43	2	16	1	68	0	0	0
Total	63	1	803	135	3,535	211	600	9	1,646	1	9	347
Corresponding week, 1943	76	1	300	44	2,830	101	573	3	1,288	0	9	1,054
Average, 1939–43	98		2,308	[1] 87	[2] 2,971	---	[1] 590		1,287	14	16	1,154

Dysentery, amebic.—Cases: Boston, 1; New York, 1, Topeka, 1.
Dysentery, bacillary.—Cases: New York, 3, Charleston, S. C., 2; Los Angeles, 1.
Dysentery, unspecified.—Cases: Cincinnati, 1, San Antonio, 2.
Tularemia.—Cases: Memphis, 1.
Typhus fever.—Cases: New Orleans, 1; San Antonio, 1.

[1] 3-year average, 1941–43.
[2] 5-year median.

Rates (annual basis) per 100,000 population, by geographic groups, for the 88 cities in the preceding table (estimated population, 1942, 34,680,400)

	Diphtheria case rates	Encephalitis, infectious, case rates	Influenza		Measles case rates	Meningitis, meningococcus, case rates	Pneumonia death rates	Poliomyelitis case rates	Scarlet fever case rates	Smallpox case rates	Typhoid and paratyphoid fever case rates	Whooping cough case rates
			Case rates	Death rates								
New England	5.0	0.0	22	2.5	757	29.9	129.5	7.5	531	0.0	5.0	77
Middle Atlantic	4.0	0.0	20	13.9	466	34.9	97.0	0.0	152	0.0	0.4	31
East North Central	5.9	0.0	22	16.4	449	23.4	60.9	0.6	237	0.6	1.8	75
West North Central	19.6	2.0	2	17.6	1,141	52.9	86.2	0.0	304	0.0	0.0	71
South Atlantic	26.1	0.0	301	47.0	740	31.3	106.1	0.0	339	0.0	1.7	45
East South Central	6.0	0.0	655	65.5	161	47.6	154.9	0.0	60	0.0	0.0	60
West South Central	8.8	0.0	432	35.3	103	52.9	135.3	2.9	41	0.0	2.9	9
Mountain	24.2	0.0	1,209	48.4	1,104	8.1	96.7	8.1	548	0.0	0.0	242
Pacific	17.5	0.0	230	17.5	377	15.8	66.6	5.3	433	0.0	1.8	25
Total	9.5	0.2	121	20.4	533	31.8	90.5	1.4	248	0.2	1.4	52

TERRITORIES AND POSSESSIONS

Virgin Islands of the United States

Notifiable diseases—October–December 1943.—During the months of October, November, and December 1943, cases of certain notifiable diseases were reported in the Virgin Islands as follows:

Disease	October	November	December	Disease	October	November	December
Chickenpox	1			Pellagra	1		
Filariasis	6	5		Schistosomiasis		1	
Gonorrhea	65	35	28	Syphilis	28	25	27
Hookworm disease	1	5	5	Tetanus	1		
Lymphogranuloma inguinale	1			Tuberculosis	2	1	
Malaria	3			Typhoid fever		3	
				Typhus fever	4	2	1

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—Week ended January 15, 1944.—During the week ended January 15, 1944, cases of certain communicable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox		17		230	398	120	67	164	59	1,055
Diphtheria	4	9	12	21	3	1	1			51
Dysentery (bacillary)				6						6
Encephalitis, infectious									1	1
German measles		1			12		2	7	1	23
Influenza	12	333	3		410	4	6		814	1,582
Measles	8	12	1	170	538	30	19	181	10	964
Meningitis, meningococcus				37	7	1				45
Mumps					230	57	7	29	43	366
Poliomyelitis									1	1
Scarlet fever		6	2	96	180	68	16	44	12	424
Tuberculosis (all forms)		7	2	59	66	7		15	12	168
Typhoid and paratyphoid fever				8	2					10
Undulant fever				1	2					3
Whooping cough		9		104	109	6	17	10	8	258

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

NOTE.—Except in cases of unusual prevalence, only those places are included which had not previously reported any of the above-named diseases, except yellow fever, during the current year. All reports of yellow fever are published currently.

A cumulative table showing the reported prevalence of these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday of each month.

(Few reports are available from the invaded countries of Europe and other nations in war zones.)

Plague

Madagascar.—During the month of December 1943, 4 cases of plague with 4 deaths were reported in Madagascar.

Morocco (French).—For the month of December 1943, plague was reported in French Morocco as follows: Casablanca, 2 cases, Marrakesh region, 1 case.

Rhodesia (Northern).—During the week ended January 8, 1944, 1 case of plague with 1 death was reported in Northern Rhodesia.

Smallpox

Algeria.—Smallpox has been reported in Algeria as follows: December 11-20, 1943, 46 cases, January 11-20, 1944, 25 cases.

British East Africa—Kenya.—Smallpox has been reported in Kenya, British East Africa, as follows: Week ended January 1, 1944, 164 cases, week ended January 8, 104 cases, week ended January 15, 241 cases.

Greece.—For the period August 1 to October 10, 1943, 403 cases of smallpox were reported in Greece.

Indochina.—Smallpox has been reported in Indochina as follows: December 21–31, 1943, 86 cases, January 1–10, 1944, 116 cases.

Morocco (French).—For the month of December 1943, 162 cases of smallpox were reported in French Morocco.

Peru—Lima.—During the week ended January 22, 1944, 14 cases of smallpox were reported in Lima, Peru.

Senegal.—For the period November 21–30, 1943, 37 cases of smallpox with 5 deaths were reported in Senegal.

Sudan (French).—For the period December 21 31, 1943, 101 cases of smallpox with 4 deaths were reported in French Sudan.

Typhus Fever

Algeria.—Typhus fever has been reported in Algeria as follows: December 11–20, 1943, 19 cases, January 11–20, 1944, 39 cases.

Arabia—Western Aden Protectorate.—Typhus fever has been reported in Western Aden Protectorate, Arabia, as follows: Week ended January 8, 1944, 1 case, 1 death, week ended January 15, 7 cases, 2 deaths.

Greece.—For the period August 21 to October 10, 1943, 30 cases of typhus fever were reported in Greece.

Hungary.—Typhus fever has been reported in Hungary as follows: Week ended December 25, 1943, 61 cases, week ended January 1, 1944, 46 cases, January 2–22, 160 cases.

Morocco (French).—For the month of December 1943, 114 cases of typhus fever were reported in French Morocco.

Netherlands.—Typhus fever has been reported in the Netherlands as follows: Week ended November 6, 1943, 1 case, week ended November 27, 2 cases.

Rumania.—Typhus fever has been reported in Rumania as follows: Week ended November 13, 1943, 75 cases, week ended January 15, 1944, 443 cases, week ended January 22, 1944, 391 cases.

Slovakia.—Typhus fever has been reported in Slovakia as follows: December 19–31, 1943, 14 cases, week ended January 8, 1944, 30 cases.

Spain.—Typhus fever has been reported in Spain as follows: November 7–27, 1943, 46 cases, week ended December 4, 1943, 9 cases.

Yellow Fever

Cape Verde Islands—Praia.—The suspected case of yellow fever at Praia, Cape Verde Islands, as published on page 187 of the PUBLIC HEALTH REPORTS of February 4, 1944, has not been confirmed.

French Guinea—Dubreka.—On December 31, 1943, 1 fatal case of suspected yellow fever was reported in Dubreka, French Guinea.

Gold Coast.—On December 3, 1943, 1 case of yellow fever with 1 death was reported in Komenda, and on January 4, 1944, 1 suspected case of yellow fever was reported in Tamale, Gold Coast.

Ivory Coast.—Yellow fever has been reported in Ivory Coast as follows: Abidjan—December 3, 1 fatal case, December 7, 1 fatal case; Aboisso—December 17, 1 suspected case; Bonoua—Grand Bassam District—December 15, 1 fatal case; Soubre—Sassandra Cercle—December 24, 1 fatal case.

FEDERAL SECURITY AGENCY

UNITED STATES PUBLIC HEALTH SERVICE

THOMAS PARRAN, *Surgeon General*

DIVISION OF PUBLIC HEALTH METHODS

G. ST. J. PERROTT, *Chief of Division*

THE PUBLIC HEALTH REPORTS, first published in 1878 under authority of an act of Congress of April 29 of that year, is issued weekly by the United States Public Health Service through the Division of Public Health Methods, pursuant to the following authority of law: United States Code, title 42, sections 7, 30, 93; title 44, section 220.

It contains (1) current information regarding the prevalence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

The PUBLIC HEALTH REPORTS is published primarily for distribution, in accordance with the law, to health officers, members of boards or departments of health, and other persons directly or indirectly engaged in public health work. Articles of special interest are issued as reprints or as supplements, in which forms they are made available for more economical and general distribution.

Requests for and communications regarding the PUBLIC HEALTH REPORTS, reprints, or supplements should be addressed to the Surgeon General, United States Public Health Service, Washington, D. C. Subscribers should remit direct to the Superintendent of Documents, Washington, D. C.

Librarians and others should preserve their copies for binding, as the Public Health Service is unable to supply the general demand for bound copies. Indexes will be supplied upon request.

UNITED STATES GOVERNMENT PRINTING OFFICE, WASHINGTON : 1944

For sale by the Superintendent of Documents, Washington 25, D. C.

Price 5 cents. Subscription price $2.50 a year

Public Health Reports

VOLUME 59 **FEBRUARY 25, 1944** NUMBER 8

IN THIS ISSUE

An Index of the Prevalence of Dental Caries

CONTENTS

Public Health Reports

Vol. 59 • FEBRUARY 25, 1944 • *No. 8*

AN INDEX OF THE PREVALENCE OF DENTAL CARIES IN SCHOOL CHILDREN [1]

By JOHN W. KNUTSON, *Dental Surgeon, United States Public Health Service*

Demands for data on the prevalence and incidence of dental caries in school children have increased markedly during recent years. These data are being used for two major purposes: First, to determine the dental service needs of a particular community, and second, to supply basic information for epidemiological studies of dental caries.

The most serious obstacle to the collection of such data has been the requirement that they be derived from detailed individual dental examinations. Few communities have available personnel experienced in making and recording dental examinations on a mass survey basis. Further, the task of analyzing the records to establish appropriate rates is of itself a relatively elaborate and time-consuming job. It becomes of practical importance, therefore, to investigate the possibilities of obtaining estimates of the prevalence of dental caries by means of abbreviated examination methods and the use of a simple index.

Although several indexes of dental caries have been presented (*1*, *2*, *3*), these have been concerned largely with measuring the incidence in individuals through the use of serial observations. Further, no one of these can be considered simple, since they depend on repeated detailed examinations of the teeth or of the saliva of each individual studied. They are indexes of individual susceptibility to dental caries during a given time period. This paper is concerned with the problem of obtaining an index of the prevalence of dental caries among school children of a given community at a specific time.

Evidence is to be presented here which indicates that there is a high degree of association between the age-specific caries prevalence rate in permanent teeth of school children and the proportion of children in the group who have experienced caries of one or more permanent teeth. The establishment of this correlation makes it possible to derive an equation expressing the relationship between these two

[1] From Child Hygiene Studies, Division of Public Health Methods.

variables. The derived equation will permit passing directly from the proportion of children with at least one carious permanent tooth to the average number of carious permanent teeth per child. The task of determining age-specific prevalence rates of dental caries in the permanent teeth of school children is thus simplified.

MATERIAL AND METHODS

Data on the age-specific prevalence of dental caries in school children of several communities have been collected by the United States Public Health Service during recent years. Details of the methods used in collecting and processing these data have been presented in previous publications (*4*, *5*, *6*). The number of children, the proportion of children with one or more carious permanent teeth, and the average number of carious permanent teeth per child are presented by age and community in table 1. Only that portion of the original data which is useful for the purposes of the present discussion is given in the table. As a measure of the prevalence of dental caries, we shall use the number of decayed, missing, or filled permanent teeth per child, which will be referred to henceforth as the number of DMF permanent teeth.

TABLE 1.—*Number of children, number of decayed, missing, or filled (DMF) permanent teeth per child, and percentage with one or more DMF permanent teeth, by age, for specified groups of school children*

Item	Age last birthday									
	6	7	8	9	10	11	12	13	14	15
Hagerstown, Md. (white)										
Number of children	327	403	487	493	529	531	596	565	695	651
DMF teeth per child	0.20	0.73	1.20	2.02	2.51	2.84	3.66	4.55	5.02	6.64
Percent with DMF teeth	15.9	36.2	53.4	70.6	78.3	81.9	87.8	91.2	94.8	95.4
Eastern Health District, Baltimore, Md. (white)										
Number of children	78	118	148	137	135	107	58	----	----	----
DMF teeth per child	0.49	0.86	1.59	2.12	2.53	3.11	3.81	----	----	----
Percent with DMF teeth	23.1	39.0	66.9	81.0	84.4	91.6	93.1	----	----	----
Eastern Health District, Baltimore, Md. (Negro):										
Number of children	164	199	233	240	213	138	85	----	----	----
DMF teeth per child	0.26	0.59	0.93	1.38	1.65	1.80	2.24	----	----	----
Percent with DMF teeth	14.6	34.2	48.5	57.9	66.2	68.1	72.9	----	----	----
Nicollet County, Minn. (white):										
Number of children	259	252	276	282	276	265	289	231	159	----
DMF teeth per child	0.51	1.43	2.30	2.86	3.39	4.16	5.50	6.32	7.69	----
Percent with DMF teeth	24.3	53.6	75.7	81.0	86.2	89.8	92.7	95.2	94.3	----
Sibley County, Minn. (white):										
Number of children	176	212	241	207	263	245	246	259	207	----
DMF teeth per child	0.56	1.36	2.03	2.68	3.24	4.62	4.97	5.65	6.82	----
Percent with DMF teeth	29.0	57.1	68.5	77.2	85.6	87.3	88.6	93.0	92.8	----

An examination of the data in table 1 reveals that for each separate group of children studied both the proportion of children with one or more DMF permanent teeth and the average number of DMF permanent teeth per child increase rather uniformly and directly with age. However, the rates at which these increases take place show wide

differences for children of different communities and for children of different color within the same community. For example, from age 6 to age 12 the percentage of children with one or more DMF permanent teeth increases from 24.3 to 92.7 in Nicollet County, Minn. (among white children), and from 14.6 to 72.9 in Baltimore, Md. (among Negro children). Over this same age interval, the average number of DMF permanent teeth per child increases from 0.51 to 5.50 in Nicollet County children and from 0.26 to 2.24 in Baltimore Negro children.

The association between the percentage of children with one or more DMF permanent teeth and the average number of DMF teeth per child may be studied with advantage by graphic methods A plot of the paired values by age was made for each group of children on arithmetic graph paper. Free-hand curves were then drawn to fit as nearly as possible the points indicating the relation of the two variables for each group of children. These showed a marked orderliness and a striking tendency to assume a common pattern and position on the respective graphs. The five diagrams were, therefore, superimposed in a single graph which is reproduced herein as figure 1. It will be noted that, with the exception of the upper part of the curve for white children of Baltimore, Md., the several curves assume a pattern that is quite uniform and suggestive of homogeneity. Aside from the exception just noted, the deviations from a common trend appear to be no greater than must ordinarily be expected from sampling variation alone.

These data on the prevalence of dental caries were obtained in a manner which would appear to make them liable to systematic errors of personal judgment as well as random errors of observation. The seemingly discrepant data for white children of Baltimore are, however, difficult to explain satisfactorily on these grounds alone. The fact that roughly one-third of the Baltimore children were selected for dental examination because of a previous history of attendance at the Eastern Health District dental clinic introduces a selective factor which was not present in the other groups. It seems possible that this factor may be the source of bias affecting this group.

Because the complete series of observations took the form of a smooth curve, an equation was sought which would describe the entire range of observation. Children aged 5 years and younger are usually characterized by none of them having one or more carious permanent teeth. Regardless of age, a value of zero for one variable automatically stipulates a value of zero for the other. Therefore, one of the logical requirements of a satisfactory equation is that it pass through the origin. It is also known that not all persons experience attack on their permanent teeth by dental caries. The most frequent figures quoted on the experience of attack range from 95 to 98 percent.

This suggests that a second requirement of the equation be that it have an upper asymptote somewhere between 95 and 98 percent. These requirements together with the general pattern of the curve suggest that some form of saturation curve such as the catalytic might be most likely to fit the observations.

The general formula for the catalytic curve passing through the origin may be written as $K-y=KB^x$, where x and y are variables and

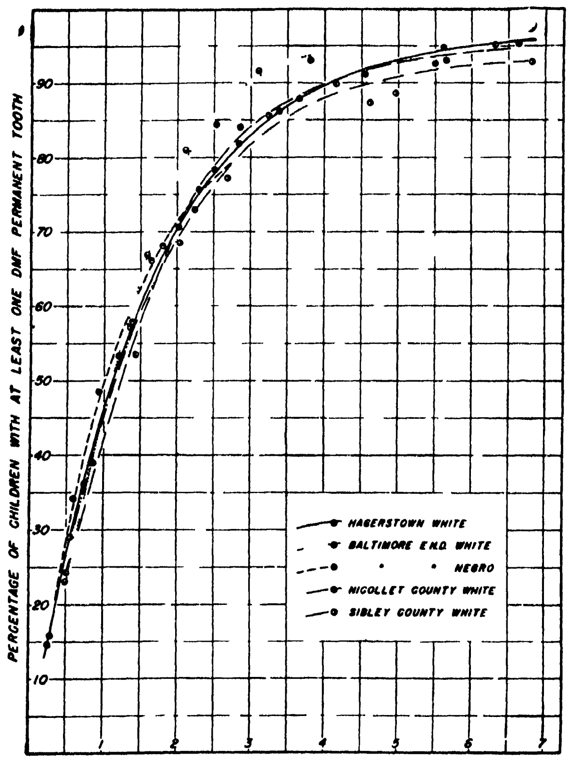


FIGURE 1.—The relationship in five communities between presence of caries in the permanent teeth of school children and the average number of such teeth affected. Values determined by single year age classes starting at 6 years, and graduated by free-hand curves

K and B are constants. Translated into terms of the present problem, y represents the proportion of children with one or more DMF permanent teeth, x represents the average number of DMF teeth per child, K represents the upper limit of y as x approaches infinity, and B is the constant proportion by which $K-y$ is changed per unit change in x. It is a characteristic of the curve that $K-y$ values plotted against corresponding x values on arithlog paper give a straight line relationship. This characteristic is useful in judging whether observed material can be fitted by this curve as well as in estimating the values of the constants.

The data for the Hagerstown (Maryland) children were plotted on arithlog paper using successive trial values of K of 95, 96, 97, and 98 percent. The Hagerstown data were selected because: First, their trend approximates the central tendency of the several curves; second, the numbers of children on which the age-specific rates are based are much larger than those for any one of the other groups of children; third, selecting one such typical group avoids the problems of the

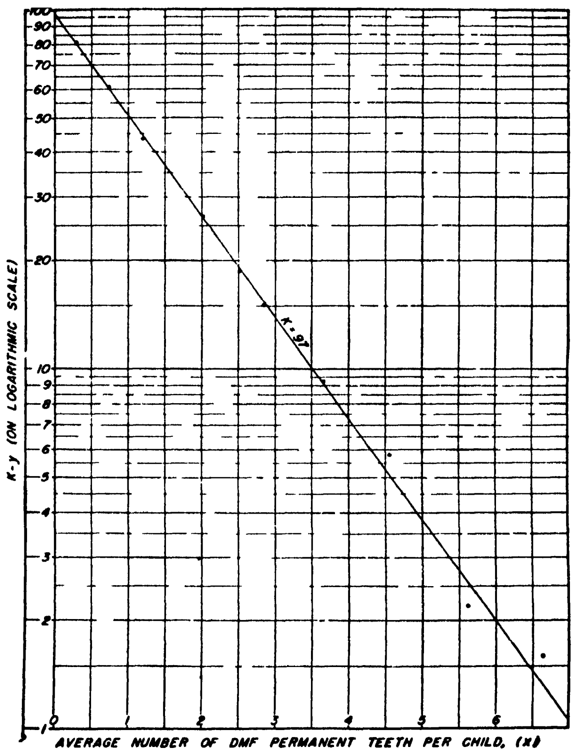


FIGURE 2.—Fitting the "catalytic" equation to the Hagerstown series, using the straight line relationship between log $(K-y)$ and x. $K=97$, and y=percent of children showing evidence of at least one carious permanent tooth

bias indicated in the Baltimore group; and fourth, the data for the other groups can be used to test the adequacy of the fitted curve in giving predicted values. For a K value of 97 percent the points fell quite well along a straight line on arithlog paper, as is shown in figure 2, and therefore this form of equation was judged satisfactory and this estimate of K accepted.

The value of B may be determined either by precision mathematical methods, such as the method of least squares, or by estimation. It should be pointed out that the method to be employed and the type of deviation to be minimized depend upon whether y is to be predicted from x, or x from y. However, if the observations are very close

to the curve, as in our case, this issue becomes a minor one, and any one of several methods will lead to essentially the same result. A simple method of estimation was used here by taking a convenient point on the straight line drawn to fit the values in figure 2 and solving for B. We find when $K-y$ is 2, then x is 6. Substituting these values in the equation $K-y=KB^x$ and solving gives $B=0.524$.

The theoretical curve calculated to cover the range of observations under consideration is presented in figure 3. The goodness of fit is

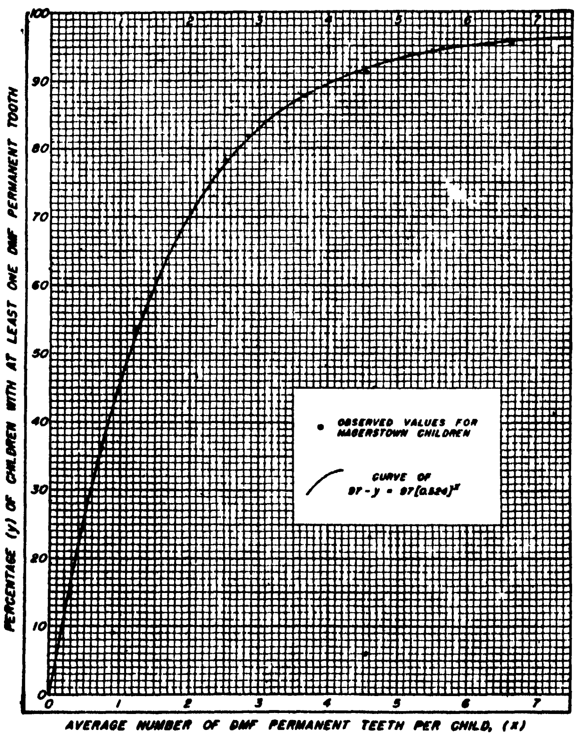


FIGURE 3.—A graph for estimating the average number of DMF permanent teeth per child from the determined percentage of children showing evidence of at least one such carious tooth.

indicated by the manner in which the observed points for the Hagerstown group fall along this curve. The conclusion is that the relationship between the percentage of children with one or more carious permanent teeth and the average number of carious permanent teeth per child is well described by the catalytic equation $97-y=97\ (0.524)^x$ where y is the percentage of children of a specific age whose permanent teeth have been attacked by caries and x is the average number of teeth attacked per child.[3]

[3] The catalytic curve was also rearranged so that the percentage of children with one or more DMF permanent teeth became the independent variable. This equation was fitted to the Hagerstown series and also to the data for all communities combined. As would be expected from the extremely high correlation between the two variables, the two equations lead to results that are essentially the same. Only the simpler catalytic curve is discussed in this paper.

DISCUSSION

The fact that there is a high degree of association between the age-specific prevalence of dental caries in a community and the proportion of children attacked in each age group seems rational. That the association should be essentially independent of such factors as color and community differences in susceptibility to dental caries is not obvious, but the fact is clearly established by these data. This characteristic of dental caries has important implications which may assist in directing future epidemiological studies on the disease. However, the present discussion will be limited to an examination of the manner in which the association may be employed to make prevalence data on dental caries more readily attainable. The limitations of the equation expressing the relation will also be discussed.

It is clear that if the evidence presented warrants a mathematical expression of the functional relation between the two variables studied, then the one, average number of carious permanent teeth per child, may be determined by obtaining the other, the proportion of children with one or more carious permanent teeth. In obtaining the latter, the simple tongue blade technique of dental examination and the mouth mirror and explorer method should be a useful complementary combination. Without sacrificing accuracy in the end results, those children who on cursory examination have obvious evidence of at least one decayed, missing, or filled permanent tooth can be examined rapidly, whereas those whose dental caries status is not so readily discerned may be more carefully examined with mouth mirror and explorer. In every case the examination is completed as soon as a single demonstration of presence of caries is made.

When the proportions of children with one or more carious permanent teeth have been obtained for age-specific groups of school children in a given community, the average number of carious teeth per child may be read directly from the curve in figure 3. For example, from each of the observed proportions of children with one or more DMF permanent teeth given in table 1, an estimate of the average number of carious teeth per child can be obtained by reference to figure 3. An illustration of the results of this procedure is given in table 2 for each of the five groups of children aged 10 years. Inasmuch as the DMF rates actually determined by complete examinations are available, they are used in this instance (table 2) for purposes of comparison. It is quite evident that all the estimates except that for Eastern Health District white children would be readily accepted as very close approximations of the observed rates.

The results given in table 2 serve to illustrate the method of using the curve in figure 3 for estimating the average number of DMF teeth per child from the observed proportion of children with one or more such teeth. If this procedure is followed for all age classes in the

community groups other than Hagerstown, 32 estimates will become available. These may be compared with the values actually found as a result of the detailed dental examination of each child. The difference in each case between the observed value and the estimate based on the Hagerstown experience alone can therefore be examined as a basis for judging the adequacy of the Hagerstown curve for application to other communities.

TABLE 2.—*Comparison of the observed and estimated number of DMF permanent teeth per child, for each of the five groups of children aged 10 years given in table 1*

School children	Observed percentage with one or more DMF permanent teeth	Estimated average number of DMF permanent teeth per child (from fig 3)	Observed average number of DMF permanent teeth per child (from table 1)
Hagerstown (white)	78.3	2.52	2.51
Eastern Health District, Baltimore (white)	84.4	3.16	2.53
Eastern Health District, Baltimore (Negro)	66.2	1.78	1.65
Nicollet County (white)	86.2	3.42	3.39
Sibley County (white)	85.6	3.33	3.24

Each difference must be examined in relation to the sampling error to be expected. As a basis for estimating the latter, one may for simplicity choose to consider the effect of sampling error in the percentage alone. The ratios of the differences to those errors (expressed as standard deviations) are given as a frequency distribution in the first line of table 3. In the second line of the table is given the distribution of such ratios to be expected on the average solely through operation of chance factors. It will be observed that the agreement is quite good. The curve drawn in figure 3 appears to give results that are quite satisfactory, except perhaps in some of the 5 cases where the observed ratio exceeds 2σ. In all these 5 cases it may be noted that the percentage of children with carious teeth was greater than 80 percent, a point which will be discussed more fully a little later. Since only one source[3] of error has in fact been allowed for, the estimates based on figure 3 must be regarded as very satisfactory at least up to y values of 80 percent.

TABLE 3.—*A comparison of the differences between estimates based on figure 3 and the known facts of average number of DMF teeth per child (by 1 year of age classes) for the communities other than Hagerstown. Each difference is expressed as a ratio to the sampling error estimated from figure 3 and the value* $\sigma_y = \sqrt{\frac{y(100-y)}{N}}$

Deviation	Deviation ranges					
		-2σ	$-\sigma$	σ	$+\sigma$	$+2\sigma$
Observed	2	4	9	10	4	3
Expected	1	4	11	11	4	1

[3] A close approximation to the error in the estimate is given by $\sigma x = \frac{0.016}{1-\frac{y}{97}}\sigma y$.

Accepting the curve in figure 3 as being valid for general application, the confidence which may be placed on prevalence rates obtained from it is dependent on two interacting factors: First, the number of children on which a given proportion is based; and second, the magnitude of the particular proportion used to find the prevalence rate. To illustrate, if 70 percent of a group of 300 children, all of the same age, were found to have one or more carious permanent teeth, then by applying this proportion to figure 3, a prevalence rate of 1.98 DMF permanent teeth per child is readily estimated for the group. But a frequency proportion of 70 percent based on a population of 300 has a sampling error to be allowed for before it should be applied to the entire community. This error is usually measured as a standard deviation, determined from the general formula $\sigma p=\sqrt{\frac{pq}{N}}$ where p is the proportion of children with one or more carious permanent teeth, $q=1-p$, and N is the number of children examined. In the present case σp is 2.64 percent. The value of x for $y=70-2\sigma$ (or 64.72 percent) is 1.72 DMF teeth per child, and the value of x for $y=70+2\sigma$ (or 75.28 percent) is 2.32. Under these conditions, the value of 1.98 DMF permanent teeth (secured directly from figure 3) will be accepted with a high degree of assurance that it is within 0.3 DMF tooth of the true value. However, if the proportion, 70 percent, resulted from observations on 30 children instead of 300, σp would be 8.37 percent, the mean estimate would still be 1.98 DMF teeth, but the range of error in the estimate would now be 2.27 DMF teeth or from 1.23 to 3.50 DMF teeth. Under these conditions the estimate would be rejected as of little or no practical worth.

Some notion of the effect that the magnitude of the proportion has on the range of error in the estimate is illustrated in table 4. As in the illustrations just given, a range of error of $\pm 2\sigma$ in the proportion is allowed for and the values of the estimated number of DMF teeth are read from figure 3. The proportions throughout are considered as calculated for a group of 300 children.

TABLE 4.—*The range of values in estimated number of DMF permanent teeth (x) based on observed percentages (y) of children with one or more DMF permanent teeth among 300 children examined*

Percentage with DMF teeth	Estimated number of DMF teeth per child	Standard deviation of error in y (in percent)	x value at $y+2\sigma y$	x value at $y-2\sigma$	Range of estimate
y	x	σy	x'	x''	$x'-x''$
90	4.07	1.73	5.08	3.47	1.61
80	2.69	2.31	3.18	2.32	.86
70	1.98	2.64	2.32	1.72	.60
50	1.13	2.85	1.33	.96	.37
30	.57	2.64	.71	.47	.24
10	.18	1.73	.22	.13	.09

It will be noted from a study of the figures presented in table 4 that σy, the standard deviation of error in the proportion, decreases as the percentages depart from 50 percent in either direction. However, the range of contingent error in the estimate $(x'-x'')$ increases progressively as the percentage of children with one or more DMF teeth increases in magnitude from 10 percent to percentages which fall on the saturation end of the curve. A range of error of 1.61 DMF teeth (or from 3.47 to 5.08 DMF teeth) when 4.07 DMF teeth is the mean estimate (as at a proportion of 90 percent) is quite high and suggests that whenever practical it would not be desirable to use this curve when proportions of 90 percent or greater are encountered. Indeed one might well question the value of the estimate when y exceeds 80 percent. Since the range of error in the estimate can be reduced by increasing the number of children on which any proportion is based, compensation for error intrinsic to the magnitude of the proportion may be made by increasing the number of children examined. However, the size of the population in a community and certain practical considerations impose limits on the numbers of children that can be examined.

Although it may appear unorthodox to refer to a regulation of the size of the proportion obtained, this can be done within certain limits through familiarity with age-specific data on the percentage of children with one or more carious permanent teeth. For example, it is evident from the data given in table 1 that if school children aged 11 years or younger were examined, there would be little risk of obtaining a proportion as great as 90 percent.

Limiting observations to children aged 11 years or younger is not of itself a serious restriction. This is true because it has been demonstrated that, in general, the DMF rates in the permanent teeth of school children increase with age in a straight-line fashion during the age span 6 to 18 years (*6*, *7*). Thus by determining the rates of prevalence of dental caries in the permanent teeth of two or three age groups, such as 7, 9, and 11 years, in a specific school population, estimates can then be obtained of the prevalence rates for the remaining age groups by linear interpolation and extrapolation.

Although the age-specific proportion of children with one or more carious permanent teeth is referred to as an index for determining the prevalence of dental caries in the permanent teeth of school children, the index is in itself a sort of prevalence figure. Getting figures on the proportion of children with one or more carious permanent teeth is analogous to getting household attack rates rather than rates based on individuals. For the material under consideration it has been demonstrated that a functional relationship exists between the proportion of "households" attacked and the average number of "individuals," or teeth attacked in each "household." It is clear,

therefore, that for the general purposes of epidemiological investigations on dental caries one might be justified in working directly with the proportions of persons attacked. For the purposes of such studies, nothing is to be gained by translating observed data on the percentages of children with one or more carious permanent teeth into estimated figures on the average number of DMF permanent teeth per child. On the other hand, the estimated figures are very useful as basic data for studies on dental needs and for studies on the evaluation of dental health programs.

SUMMARY

The relationship between the percentage of children of a specific age with one or more carious permanent teeth (y) and the average number of carious permanent teeth per child (x) of that age can be satisfactorily described by the equation $97-y=97(0.524)^x$.

The application of the equation to the problem of collecting prevalence data on dental caries is discussed. In particular it is shown that satisfactory estimates of the average number of carious (DMF) permanent teeth per child in a community may be obtained by determining the proportion of children by single years of age who have one or more DMF permanent teeth.

ACKNOWLEDGMENT

The author wishes to acknowledge his indebtedness to Margaret Merrell of the Johns Hopkins School of Hygiene and Public Health and Alan E. Treloar of the University of Minnesota Medical School, for their helpful assistance in the preparation of this manuscript.

REFERENCES

(1) Bodecker, Charles F.: The modified dental caries index. J. Am. Dent. Assoc., **26**: 1453–1460 (September 1939).
(2) Hadley, Faith P.: A quantitative method for estimating bacillus acidophilus in the saliva. J. Dent. Research, **13**: 415–428 (October 1933).
(3) Fosdick, Leonard S., Hansen, Harold L., and Epple, Charlotte: Enamel decalcification by mouth organisms and dental caries: A suggested test for caries susceptibility. J. Am. Dent Assoc, **24**: 1275–1280 (August 1937).
(4) Klein, Henry, and Palmer, C. E.: Studies on dental caries X. Procedure for recording and statistical processing of dental examination findings. J. Dent. Research, **19**: 243–256 (June 1940).
(5) ———: Disparity between dental need and dental care in school children of Hagerstown, Maryland, and environs. J. Am. Dent. Assoc., **28**: 1489–1498 (September 1941).
(6) Knutson, John W.: Appraising the dental health program. J. Am. Dent. Assoc., **29**: 543–556 (April 1942).
(7) Klein, Henry, and Palmer, C. E.: On the epidemiology of dental caries. University of Pennsylvania Bicentennial Conference. Univ. Penn. Press, Philadelphia, 1941.

AID IN THE RELOCATION OF PHYSICIANS AND DENTISTS

During its first session, the 78th Congress passed a deficiency appropriation bill which included an authorization to the United States Public Health Service to enter into agreements with and make certain payments to physicians and dentists to relocate in communities needing medical and dental services. On December 23, 1943, this measure became Public Law 216, 78th Congress.

The law is designed to provide relief to those areas which for various reasons have undergone the hardship of inadequate medical and dental care. Many of these communities have lost their doctors and dentists to the armed forces.

The law also provides an opportunity for the physician or dentist who has wanted to set up practice in another community but has hesitated because of the financial risk of those first months during which he and the families in the new town are becoming acquainted. Now, with a 3-month allowance assured and with transportation paid for him, he can make that move with less fear of financial loss.

Any municipality, county, or other local subdivision of government may file an application to secure a physician or dentist. Application forms are secured from the State health department. The application is executed by the legally authorized representative of the community (the city manager, mayor, chairman of the county board of supervisors, county judge, etc.). The application is sent, with the community's remittance of $300, made payable to the Treasurer of the United States, to the State health department for approval. When this approval is given, the State health department forwards the community's application and $300 to the United States Public Health Service.

Upon receipt of the community's application and payment of $300 the Public Health Service can enter into an agreement with a physician or dentist who has a permit to practice in the State in which the applicant community is located, who agrees to practice in that community for at least 1 year, and who is acceptable to the community. The costs of transportation of the physician or dentist, his family, and household effects are paid. In addition, a monthly allowance of $250 a month for 3 months will be paid to the doctor. Of the total cost of transportation and relocation allowance, 75 percent is contributed by the United States Public Health Service and 25 percent by the community to which the doctor is relocated.

The total relocation cost to the community will be about $300. If the community's obligation should exceed $300, the balance due must be remitted to the United States Public Health Service upon the latter's request. If it is less than $300, the excess will be refunded to the community.

After a written agreement between an individual physician or dentist and the United States Public Health Service has been concluded, the first monthly relocation allowance to the physician or dentist accrues from the date of the latter's arrival at the new location. The second and third payments are made at the end of the second and third months.

Travel and transportation costs can be paid in either of two ways. The physician or dentist who has a written agreement with the Public Health Service can apply to the latter for Government transportation requests and Government bills of lading. If this arrangement is carried out, the Government is billed and the physician or dentist does not have to use his own funds to cover this expense. Or, if he prefers, he may pay travel transportation himself and be reimbursed for actual and necessary expense upon presentation of his claim to the Public Health Service. These claims must be supported by receipts insofar as possible.

The physician or dentist relocating under agreement with the Public Health Service remains a private self-employed professional individual. His relation to the community is the same as that of any other private doctor except that he must practice in the new location at least 1 year. The Public Health Service simply assists in getting together the community that needs a physician or dentist with the professional man who has the necessary permit to practice and who agrees to serve that community in his professional capacity.

The purpose of this relocation plan is to mitigate the doctor shortage, which in some places has been created, in others intensified, by military absorption of medical and dental personnel. The success of the plan will depend in large measure upon the response of the individual doctor, the initiative of the needy community, and, above all, upon the extent to which the wishes of the applicant communities coincide with the preference of the doctors who volunteer to serve under this plan.

ANNUAL CONFERENCE OF THE UNITED STATES PUBLIC HEALTH SERVICE WITH THE STATE AND TERRITORIAL HEALTH OFFICERS

The Forty-second Annual Conference of the United States Public Health Service with the State and Territorial Health Officers will be held in Washington, D. C., March 21 and 23, 1944.

As in recent years, the Conference of the United States Children's Bureau with the State and Territorial Health Officers, and the annual meetings of the State and Provincial Health Authorities of North America and of the State and Territorial Health Association will be held concurrently.

General sessions of all three conferences will meet in the auditorium of the District of Columbia Medical Society, 1718 M Street NW. Committee meetings will be held at the Blaine Building, 2000 Massachusetts Avenue NW.

The Conference of the Public Health Service with State and Territorial Health Officers will consider specific problems affecting public health departments; special attention will be directed toward several diseases which have increased in importance during the war.

The Conference will be opened by the Surgeon General and speakers at the first general session will include: the Honorable Paul V. McNutt, Administrator of the Federal Security Agency, Assistant Surgeon General R. E. Dyer, Medical Director Joseph W. Mountin, Medical Director E. R. Eskey, and Mr. Stanley Freeborn.

SCHEDULE OF MEETINGS

MONDAY, MARCH 20, 1944

Morning—Executive meeting of State and Territorial Health Officers' Association.

Afternoon—Conference of United States Children's Bureau with State and Territorial Health Officers.

TUESDAY, MARCH 21, 1944

Morning—Conference of United States Public Health Service with State and Territorial Health Officers.

Afternoon—Committee meetings of above conference with consultants of the United States Public Health Service, Blaine Building, 2000 Massachusetts Avenue NW.

Evening—Executive meeting of State and Territorial Health Officers' Association (place to be announced later).

WEDNESDAY, MARCH 22, 1944

Morning and Afternoon—Conference of State and Provincial Health Authorities of North America.

THURSDAY, MARCH 23, 1944

Morning—Conference of United States Children's Bureau with State and Territorial Health Officers.

Afternoon—Conference of the United States Public Health Service with State and Territorial Health Officers.

Committees	*Committee members*	*Consultants*
Federal-State relations and allocation of Federal funds.	Dr. E. S. Godfrey, Jr., chairman. Dr. Stanley H. Osborn, vice chairman. Dr. J. Lynn Mahaffey. Dr. Robert H. Riley. Dr. T. F. Abercrombie. Dr. L. E. Powers. Dr. A. J. Chesley. Dr. I. C. Riggin. Dr. Walter L. Bierring. Dr. T. T. Ross.	Dr. L. E. Burney. Mr. Stanley Drexler. Dr. J. G. Townsend.

Committees	*Committee members*	*Consultants*
Venereal disease	Dr. B. F. Austin, chairman. Dr. Roland R. Cross, vice chairman. Dr. E. V. Thiehoff. Dr. R. H. Markwith. Dr. Gilbert Cottam. Dr. Edward A. McLaughlin. Dr. Felix J. Underwood. Dr. W. F. Cogswell. Dr. G. R. Smith.	Dr. J. R. Heller. Dr. O. L. Anderson. Miss Lida J. Usilton.
Personnel	Dr. Carl N. Neupert, chairman. Dr. C. A. Selby, vice chairman. Dr. Robert H. Riley. Dr. Carl V. Reynolds. Dr. Stanley H. Osborn. Dr. R. L. Cleere. Dr. J. Lynn Mahaffey. Dr. Frederick D. Stricker. Dr. Edward E. Hamer.	Mr Ellis Tisdale. Miss Gladys Crain. Miss Bess Cheney.
Business management	Dr. F. C. Beelman, chairman. Dr. Frank J. Hill, vice chairman. Dr. M. C. Keith. Dr. James Stewart. Dr. George C Ruhland. Dr. William M. McKay. Dr. Mary M. Atchison. Dr Roscoe L. Mitchell. Dr J. E Offner. Dr. R. H. Hutcheson.	Mr. A. W. Oliphant. Miss Evelyn Flook. Mr. L. V. Phelps.
Interstate and foreign quarantine.	Dr. Henry Hanson, chairman. Dr. Wilton L. Halverson, vice chairman. Dr. Knud Knud-Hansen Dr. C. L. Wilbar, Jr. Dr. George W. Cox. Dr. A. Fernos Isern. Dr. C. C. Carter. Dr. James R. Scott. Dr. G. F. Manning. Dr. David E. Brown.	Mr. John Hoskins Dr. J. P. Leake. Dr G. L. Dunnahoo.
Health programs	Dr. Thurman B. Rice, chairman. Dr. Edwin Cameron, vice chairman. Dr. T. F. Abercrombie. Dr. James Stewart. Dr. James A. Hayne. Dr. Frederick D. Stricker. Dr. Charles F. Dalton. Dr. P. E. Blackerby.	Dr. J. W. Mountin. Mr. Ernest Boyce. Mr. G. St. J. Perrott.

PREVALENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED FEBRUARY 19, 1944

Summary

A further slight decrease occurred in the incidence of meningococcus meningitis. A total of 529 cases was reported, as compared with 562 last week, 398 for the corresponding week last year, and a 5-year (1939–43) median of 69. Nine States reported an aggregate of 303 cases, or 57 percent of the total, as follows (last week's figures in parentheses): *Increases*—Massachusetts 19 (9), New York 65 (57), Ohio 31 (27), Missouri 23 (17), Virginia 25 (13), Tennessee 33 (28), California 54 (44); *decreases*—Pennsylvania 27 (37), Michigan 26 (33). The average weekly total for the past 3 weeks is 554, as compared with 568 for the next preceding 4 weeks. The cumulative total to date is 3,936, as compared with 2,456 for the same period last year and a 5-year median of 386.

A total of 7,199 cases of influenza was reported, as compared with 10,748 for the preceding week and 6,895 for the 5-year median. Currently, 57 percent of the cases were reported in 3 States—Texas 2,736, South Carolina 801, and Virginia 601.

The reported numbers of cases of measles and scarlet fever declined slightly as compared with last week. The incidence of measles, both currently and to date for the year, is approximately 45 percent above the corresponding 5-year medians, and the current and cumulative figures for scarlet fever are 42 and 31 percent higher than the respective medians.

Of 91 cases of typhoid fever, 28 occurred in Indiana, 14 in Texas, and 8 in New York State. A total of 586 cases has been reported to date, as compared with 356 for the same period last year and a 5-year median of 539. The recent outbreaks in Kentucky (36 cases this year to date) and Indiana (209 cases) have contributed largely to this excess incidence.

Deaths recorded in 89 large cities of the United States totaled 9,698 for the current week, as compared with 9,337 last week and a 3-year (1941–43) average of 9,633. The cumulative total to date is 73,512 as compared with 71,316 for the same period last year.

'elegraphic morbidity reports from State health officers for the week ended February 19, 1944, and comparison with corresponding week of 1943 and 5-year median

In these tables a zero indicates a definite report, while leaders imply that, although none was reported, ses may have occurred.

Division and State	Diphtheria			Influenza			Measles			Meningitis, meningococcus		
	Week ended		Median 1939–43	Week ended		Median 1939–43	Week ended		Median 1939–43	Week ended		Median 1939–43
	Feb. 19, 1944	Feb. 20, 1943		Feb. 19, 1944	Feb. 20, 1943		Feb. 19, 1944	Feb. 20, 1943		Feb. 19, 1944	Feb. 20, 1943	
NEW ENGLAND												
Maine	1	0	1	2	1	7	196	6	122	3	11	0
New Hampshire	0	0	0	---	---	---	3	10	7	0	1	0
Vermont	0	0	0	14	---	---	94	275	7	1	0	0
Massachusetts	4	0	2	---	---	---	462	760	454	19	15	2
Rhode Island	1	0	1	---	---	---	423	8	14	11	28	0
Connecticut	0	0	0	8	4	4	330	320	282	6	5	0
MIDDLE ATLANTIC												
New York	8	15	23	[1] 7	[1] 5	[1] 43	1, 631	1, 772	1, 048	65	42	6
New Jersey	2	6	8	13	23	30	1, 235	1, 078	166	13	29	1
Pennsylvania	5	9	20	8	4	---	1, 080	3, 498	1, 174	27	21	7
EAST NORTH CENTRAL												
Ohio	10	10	10	75	11	28	3, 035	154	154	31	6	3
Indiana	15	4	12	67	36	113	266	175	43	17	7	1
Illinois	15	9	20	40	5	127	926	506	226	17	16	0
Michigan [2]	7	4	6	12	1	31	1, 386	205	275	26	5	1
Wisconsin	1	3	1	202	56	56	1, 810	946	769	6	12	0
WEST NORTH CENTRAL												
Minnesota	4	2	4	5	---	2	1, 082	32	366	4	3	0
Iowa	7	3	4	3	2	27	133	148	174	15	1	0
Missouri	7	2	5	8	---	38	212	228	73	23	6	1
North Dakota	1	1	1	10	6	20	299	28	28	2	0	0
South Dakota	0	12	0	---	---	3	128	66	31	0	0	0
Nebraska	2	0	4	1	39	3	82	258	62	1	2	0
Kansas	3	10	10	1	14	17	555	333	251	9	10	0
SOUTH ATLANTIC												
Delaware	1	0	1	---	6	---	8	23	6	1	2	0
Maryland [2]	6	2	2	28	8	131	662	37	60	12	15	4
District of Columbia	0	1	2		4	18	112	80	31	1	2	1
Virginia	2	10	10	601	440	1, 338	904	378	176	25	29	4
West Virginia	2	5	5	60	10	53	496	11	21	5	0	0
North Carolina	12	6	16	48	35	71	1, 136	76	257	7	14	0
South Carolina	6	4	4	801	643	972	279	36	36	6	6	1
Georgia	2	2	5	164	205	205	383	52	248	5	1	1
Florida	5	1	4	68	5	5	183	23	55	2	3	0
EAST SOUTH CENTRAL												
Kentucky	1	5	5	188	10	136	0	622	106	8	4	2
Tennessee	5	9	10	203	76	79	273	125	119	33	1	1
Alabama	9	7	8	177	188	453	339	17	140	17	4	3
Mississippi [2]	2	6	6	---	---	---	---	---	---	7	4	2
WEST SOUTH CENTRAL												
Arkansas	5	5	5	336	145	458	150	171	107	5	0	0
Louisiana	7	6	6	122	21	21	84	126	57	7	4	1
Oklahoma	4	2	8	276	26	227	112	30	30	4	1	0
Texas	31	50	42	2, 736	1, 639	1, 790	731	379	379	14	13	6
MOUNTAIN												
Montana	0	6	6	83	8	8	253	248	168	1	0	0
Idaho	1	17	1	---	---	---	53	205	36	0	3	0
Wyoming	2	0	0	7	33	33	110	43	34	0	0	0
Colorado	5	7	12	79	84	84	297	519	106	5	0	0
New Mexico	1	3	1	2	1	2	16	21	42	2	0	0
Arizona	5	0	5	168	144	144	158	21	21	0	1	0
Utah [2]	0	1	0	384	57	16	16	393	81	0	7	0
Nevada	0	0	0	---	---	---	0	14	2	0	0	0
PACIFIC												
Washington	4	3	3	10	8	3	215	1, 189	271	7	11	1
Oregon	2	4	3	65	28	37	84	306	193	5	22	0
California	27	15	20	117	103	103	621	383	383	54	31	2
Total	240	267	287	7, 199	4, 134	6, 895	23, 043	16, 334	15, 869	529	398	69
7 weeks	1, 805	2, 186	2, 396	294, 840	31, 258	33, 080	114, 962	78, 682	78, 682	3, 936	2, 456	386

See footnotes at end of table.

Telegraphic morbidity reports from State health officers for the week ended February 19, 1944, and comparison with corresponding week of 1943 and 5-year median—Con.

Division and State	Poliomyelitis			Scarlet fever			Smallpox			Typhoid and paratyphoid fever [3]		
	Week ended		Median 1939–43	Week ended		Median 1939–43	Week ended		Median 1939–43	Week ended		Median 1939–43
	Feb. 19, 1944	Feb. 20, 1943		Feb. 19, 1944	Feb. 20, 1943		Feb. 19, 1944	Feb. 20, 1943		Feb. 19, 1944	Feb. 20, 1943	
NEW ENGLAND												
Maine	0	0	0	28	0	19	0	0	0	1	1	0
New Hampshire	0	0	0	11	8	4	0	0	0	1	0	0
Vermont	0	0	0	4	13	13	0	0	0	0	0	0
Massachusetts	1	0	0	490	605	222	0	0	0	0	2	2
Rhode Island	0	0	0	17	14	14	0	0	0	1	0	0
Connecticut	0	0	0	104	71	71	0	0	0	0	0	0
MIDDLE ATLANTIC												
New York	2	1	1	574	507	507	0	0	0	8	2	4
New Jersey	0	0	0	141	154	166	0	0	0	1	0	0
Pennsylvania	0	0	0	318	303	370	0	0	0	2	5	5
EAST NORTH CENTRAL												
Ohio	0	0	0	365	259	370	0	1	0	2	3	3
Indiana	0	0	0	225	83	179	0	9	1	28	0	3
Illinois	0	1	1	361	272	445	2	0	0	1	2	2
Michigan [2]	1	0	0	218	105	290	0	0	3	3	3	2
Wisconsin	0	0	0	355	294	219	0	0	4	0	1	0
WEST NORTH CENTRAL												
Minnesota	0	0	0	215	62	82	0	0	7	0	0	0
Iowa	0	0	0	168	97	75	1	1	1	0	0	0
Missouri	0	0	0	78	94	87	0	1	2	3	0	0
North Dakota	0	0	0	43	12	21	0	0	0	0	0	1
South Dakota	1	0	0	32	16	21	0	1	2	0	0	0
Nebraska	0	0	0	54	45	31	0	0	0	0	2	0
Kansas	0	0	0	88	89	89	0	0	1	0	1	1
SOUTH ATLANTIC												
Delaware	0	0	0	9	4	16	0	0	0	0	1	0
Maryland [2]	0	0	0	178	80	73	0	0	0	0	1	1
District of Columbia	1	0	0	221	24	20	0	0	0	0	0	0
Virginia	0	0	0	76	33	33	0	0	0	2	8	2
West Virginia	0	0	0	64	28	37	0	0	0	3	0	1
North Carolina	1	1	1	33	47	55	0	0	0	1	3	0
South Carolina	0	0	0	13	4	8	0	0	0	0	0	1
Georgia	1	0	0	12	21	19	0	0	0	2	1	4
Florida	0	1	0	12	9	9	0	0	0	1	0	2
EAST SOUTH CENTRAL												
Kentucky	1	1	2	91	62	81	0	0	1	2	3	1
Tennessee	0	0	1	66	80	80	0	0	1	3	0	3
Alabama	0	1	0	22	8	15	0	0	0	1	2	1
Mississippi [2]	1	1	0	4	9	6	0	1	1	1	2	2
WEST SOUTH CENTRAL												
Arkansas	0	0	0	13	9	9	0	13	2	1	2	2
Louisiana	1	0	1	3	6	6	0	0	0	2	8	3
Oklahoma	0	0	0	27	12	23	0	0	0	1	1	1
Texas	2	2	2	77	83	68	4	5	5	14	4	4
MOUNTAIN												
Montana	0	0	0	55	8	32	0	1	0	0	1	0
Idaho	1	1	0	40	4	7	0	0	0	0	0	0
Wyoming	0	0	0	10	29	9	0	0	0	0	0	0
Colorado	1	0	0	57	79	55	0	0	2	1	0	0
New Mexico	0	0	0	16	4	7	1	0	0	0	1	0
Arizona	0	1	0	30	11	8	0	0	0	1	0	0
Utah [2]	0	1	1	158	77	33	0	0	0	0	0	0
Nevada	0	0	0	0	0	0	0	0	0	0	0	0
PACIFIC												
Washington	2	1	0	221	36	56	0	0	0	0	0	0
Oregon	0	0	0	103	15	17	0	0	0	2	1	0
California	9	8	3	270	153	153	0	0	0	2	3	3
Total	26	21	26	5,770	4,038	4,069	8	33	41	91	64	64
7 weeks	185	213	213	34,004	26,048	26,048	88	216	339	586	356	539

See footnotes at end of table.

Telegraphic morbidity reports from State health officers for the week ended February 19, 1944, and comparison with corresponding week of 1943 and 5-year median—Con.

Division and State	Whooping cough: Week ended— Feb. 19, 1944	Whooping cough: Week ended— Feb. 20, 1943	Whooping cough: Median 1939-43	Week ended Feb. 19, 1944: Anthrax	Dysentery: Amebic	Dysentery: Bacillary	Dysentery: Unspecified	Encephalitis, infectious	Leprosy	Rocky Mt spotted fever	Tularemia	Typhus fever
NEW ENGLAND												
Maine	4	48	39	0	0	0	0	0	0	0	0	0
New Hampshire	0	0	3	0	0	0	0	0	0	0	0	0
Vermont	23	27	34	0	0	0	0	0	0	0	0	0
Massachusetts	73	164	204	0	0	0	0	0	0	0	0	0
Rhode Island	16	5	8	0	0	0	0	0	0	0	0	0
Connecticut	18	26	56	0	0	0	0	0	0	0	0	0
MIDDLE ATLANTIC												
New York	143	350	418	0	1	18	0	8	0	0	0	0
New Jersey	34	203	203	0	0	0	0	0	0	0	0	0
Pennsylvania	117	273	273	1	1	0	0	0	0	0	0	1
EAST NORTH CENTRAL												
Ohio	97	180	202	0	0	0	0	0	0	0	0	0
Indiana	43	22	33	0	0	0	0	0	0	0	1	0
Illinois	51	173	131	0	0	0	0	1	0	0	2	0
Michigan [3]	75	264	238	0	1	1	0	0	0	0	0	0
Wisconsin	82	212	212	0	0	0	0	0	0	0	0	0
WEST NORTH CENTRAL												
Minnesota	22	83	38	0	0	0	0	0	0	0	1	0
Iowa	19	28	14	0	0	0	0	0	0	0	0	0
Missouri	13	2	9	0	0	0	0	0	0	0	0	0
North Dakota	2	5	7	0	0	0	0	0	0	0	0	0
South Dakota	2	5	5	0	0	0	0	0	0	0	0	0
Nebraska	25	14	5	0	0	0	0	0	0	0	0	0
Kansas	27	63	46	0	0	0	0	1	0	0	0	0
SOUTH ATLANTIC												
Delaware	0	9	98	0	0	0	0	0	0	0	0	0
Maryland [2]	18	85	850	0	0	0	0	1	0	0	0	0
District of Columbia	1	10	14	0	0	0	0	0	0	0	0	0
Virginia	23	56	7	0	0	0	53	0	0	0	0	0
West Virginia	29	40	3	0	0	0	0	0	0	0	0	0
North Carolina	126	131	211	0	0	0	0	0	0	0	1	0
South Carolina	51	29	54	0	0	0	0	0	0	0	0	0
Georgia	0	40	27	0	0	0	0	0	0	0	0	4
Florida	60	29	19	0	2	0	0	0	0	0	0	1
EAST SOUTH CENTRAL												
Kentucky	39	50	50	0	0	0	0	0	0	0	0	0
Tennessee	24	73	51	0	0	0	0	1	0	0	0	3
Alabama	5	27	25	0	0	0	0	0	0	0	1	8
Mississippi [2]	---	---	---	0	0	0	0	0	0	0	0	0
WEST SOUTH CENTRAL												
Arkansas	10	35	8	0	0	1	0	0	0	0	0	0
Louisiana	7	12	11	0	3	0	0	0	1	0	2	3
Oklahoma	1	15	9	0	0	0	0	0	0	0	0	0
Texas	118	412	162	0	4	127	0	2	1	0	1	5
MOUNTAIN												
Montana	5	49	5	0	0	0	0	0	0	0	0	0
Idaho	1	5	5	0	0	0	0	0	0	0	0	0
Wyoming	3	1	2	0	1	0	0	0	0	0	0	0
Colorado	21	14	33	0	0	0	0	0	0	0	0	0
New Mexico	3	19	22	0	0	0	1	0	0	0	0	0
Arizona	15	16	16	0	0	0	7	0	0	0	0	0
Utah [2]	16	17	28	0	0	0	0	0	0	0	0	0
Nevada	0	0	0	0	0	0	0	0	0	0	0	0
PACIFIC												
Washington	49	44	44	0	0	0	0	0	0	0	0	0
Oregon	29	5	15	0	0	0	0	0	0	0	0	0
California	64	267	185	0	1	6	0	0	0	0	0	0
Total	1,604	3,637	3,637	1	14	153	61	9	2	0	9	25
7 weeks	12,649	27,046	29,267	6	143	1,538	381	63	5	1	80	324
7 weeks, 1943	-----	-----	-----	10	131	1,212	258	65	4	1	130	399

[1] New York City only.
[2] Period ended earlier than Saturday.
[3] Including paratyphoid fever cases reported separately as follows: Michigan, 1; Colorado, 1.

WEEKLY REPORTS FROM CITIES

City reports for week ended February 5, 1944

This table lists the reports from 87 cities of more than 10,000 population distributed throughout the United States, and represents a cross section of the current urban incidence of the diseases included in the table.

	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
NEW ENGLAND												
Maine:												
Portland	0	0	-----	0	5	2	6	0	11	0	0	0
New Hampshire:												
Concord	0	0	-----	0	0	1	2	0	1	0	0	0
Vermont:												
Barre	0	0	-----	0	0	0	0	0	1	0	0	0
Massachusetts:												
Boston	2	0	-----	1	38	11	22	0	61	0	0	28
Fall River	0	0	-----	0	4	0	1	0	3	0	0	3
Springfield	0	0	-----	0	53	1	1	0	17	0	0	4
Worcester	0	0	-----	0	4	0	6	0	39	0	0	1
Rhode Island:												
Providence	0	0	1	0	173	4	6	0	5	0	0	11
Connecticut:												
Bridgeport	0	1	1	1	9	0	3	0	7	0	0	0
Hartford	1	0	-----	0	0	0	0	0	14	0	0	1
New Haven	0	0	-----	0	25	2	6	0	2	0	0	5
MIDDLE ATLANTIC												
New York:												
Buffalo	0	0		0	5	2	15	0	11	0	0	0
New York	7	1	12	4	958	46	90	0	217	0	3	47
Rochester	0	0	-----	1	1	2	6	0	8	0	0	1
Syracuse	0	0	-----	0	1	1	1	0	8	0	0	10
New Jersey:												
Camden	0	0	-----	1	0	1	0	0	10	0	0	8
Newark	0	0	5	0	29	4	4	0	21	0	0	13
Trenton	0	0	2	1	3	0	5	0	18	0	0	1
Pennsylvania:												
Philadelphia	1	0	8	5	15	15	23	0	49	0	0	9
Pittsburgh	1	1	4	6	274	8	17	0	16	0	0	6
Reading	0	0	-----	0	4	0	1	0	2	0	0	0
EAST NORTH CENTRAL												
Ohio:												
Cincinnati	3	0		0	9	4	10	0	29	0	0	0
Cleveland	0	0	6	1	741	4	11	0	62	0	6	13
Columbus	0	1	3	3	70	0	5	0	8	0	0	7
Indiana:												
Fort Wayne	0	0	-----	0	31	0	6	0	2	0	2	0
Indianapolis	1	0	-----	2	27	1	12	0	35	0	0	5
South Bend	0	0	-----	0	4	0	0	0	0	0	0	0
Terre Haute	1	0	-----	0	1	0	2	0	0	0	0	0
Illinois:												
Chicago	3	0	6	3	38	12	30	0	129	0	0	18
Springfield	0	0	3	0	69	0	0	0	2	0	0	0
Michigan:												
Detroit	5	0	3	0	38	14	0	0	65	0	0	8
Flint	0	0	-----	0	6	2	2	0	4	0	0	3
Grand Rapids	0	0	-----	0	234	1	2	0	6	0	0	1
Wisconsin:												
Kenosha	0	0	-----	0	0	0	0	0	6	0	0	4
Milwaukee	0	0	1	1	35	6	8	0	90	0	0	29
Racine	0	0	-----	0	0	0	1	0	7	0	0	10
Superior	0	0	-----	0	23	0	2	0	5	0	0	0
WEST NORTH CENTRAL												
Minnesota:												
Duluth	0	0	-----	0	7	0	0	0	25	0	0	20
Minneapolis	5	0	-----	1	418	2	6	0	49	0	0	10
St. Paul	0	0	-----	0	256	1	2	0	60	0	0	6
Missouri:												
Kansas City	0	0	-----	4	7	4	17	0	30	0	0	1
St. Joseph	0	0	-----	0	0	0	0	0	5	0	0	0
St. Louis	0	0	4	3	88	15	19	0	13	0	0	7
Nebraska:												
Omaha	2	0	-----	1	1	0	2	0	35	0	0	0
Kansas:												
Topeka	1	0	-----	0	1	0	1	0	1	0	0	8
Wichita	0	0	-----	0	192	0	3	0	3	0	0	0

City reports for week ended February 5, 1944—Continued

	Diphtheria cases	Encephalitis, infectious, cases	Influenza Cases	Influenza Deaths	Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
SOUTH ATLANTIC												
Delaware:												
Wilmington	2	0		0	9	0	5	0	0	0	0	0
Maryland:												
Baltimore	1	0	6	2	328	9	19	0	56	0	0	12
Cumberland	0	0	2	1	0	0	0	0	0	0	0	0
Frederick	0	0		0	4	0	0	0	0	0	0	0
District of Columbia:												
Washington	0	0	9	0	39	5	13	0	184	0	0	6
Virginia:												
Lynchburg	0	0	30	0	11	0	1	0	0	0	0	0
Richmond	0	0	1	1	65	5	2	0	3	0	0	0
Roanoke	0	0		0	31	0	0	0	0	0	0	1
West Virginia:												
Charleston	0	0	1	0	0	0	0	0	3	0	0	0
Wheeling	0	0		0	0	0	1	0	2	0	0	2
North Carolina:												
Winston-Salem	6	0		0	47	1	0	0	2	0	0	5
South Carolina:												
Charleston	0	0	55	1	19	5	4	0	0	0	1	0
Georgia:												
Atlanta	3	0	43	0	46	2	3	0	4	0	1	1
Brunswick	0	0	2	0	64	1	2	0	0	0	0	0
Savannah	0	0	13	3	0	3	1	0	0	0	0	0
Florida:												
Tampa	0	0	1	1	18	0	2	0	2	0	0	0
EAST SOUTH CENTRAL												
Tennessee:												
Memphis	1	0	15	6	9	5	5	0	4	0	1	5
Nashville	0	0		1	2	0	6	0	6	0	0	0
Alabama:												
Birmingham	1	0	11	2	9	0	4	0	3	0	0	0
Mobile	2	0	17	0	3	2	2	0	1	0	0	1
WEST SOUTH CENTRAL												
Arkansas:												
Little Rock	0	0	1	0	17	1	4	0	0	0	0	2
Louisiana:												
New Orleans	7	0	21	6	9	9	11	0	4	0	1	2
Shreveport	0	0		4	0	0	12	0	0	0	0	0
Texas:												
Dallas	2	0	1	1	9	2	5	0	3	0	0	1
Galveston	1	0	21	0	0	0	2	0	1	0	0	0
Houston	1	0		1	15	4	4	1	2	0	0	0
San Antonio	1	0	1	2	6	4	7	0	0	0	0	0
MOUNTAIN												
Montana:												
Billings	0	0		0	0	0	2	0	1	0	0	0
Great Falls	0	0	27	1	7	1	0	0	9	0	0	2
Helena	0	0		0	4	0	1	0	4	0	0	0
Missoula	0	0		0	2	0	0	0	3	0	0	0
Idaho:												
Boise	0	0		0	0	1	0	0	0	0	0	0
Colorado:												
Denver	4	0	16	1	43	1	7	0	22	0	0	23
Pueblo	0	0		0	57	0	0	0	2	0	0	3
Utah:												
Salt Lake City	0	0		0	5	0	0	0	35	0	0	3
PACIFIC												
Washington:												
Seattle	0	0		2	7	1	6	0	0	0	0	10
Spokane	0	0	2	2	46	0	0	0	13	0	0	1
Tacoma	1	0		0	2	2	3	0	61	0	0	1
California:												
Los Angeles	4	0	53	4	86	2	11	0	41	0	1	7
Sacramento	0	0	1	2	4	2	4	0	0	0	0	0
San Francisco	0	0	31	0	11	5	8	0	23	0	0	7
Total	70	4	440	83	4,934	239	513	1	1,686	0	16	388
Corresponding week, 1943	68	3	216	44	3,623	119	607	9	1,336	5	10	1,052
Average, 1939–43	89		2,262	[1] 84	[2] 3,289		[1] 584		1,333	14	15	1,093

Dysentery, amebic.—Cases: Boston, 2; New York, 1.

Dysentery, bacillary.—Cases: Worcester, 3; New York, 13, St. Louis, 1; Charleston, S. C., 1; Los Angeles, 1.

Tularemia.—Cases: St. Louis, 1.

Typhus fever.—Cases: St Louis, 2; Charleston, S. C., 2, Atlanta, 1; Savannah, 2.

[1] 3-year average, 1941–43.

[2] 5-year median.

Rates (annual basis) per 100,000 population, by geographic groups, for the 87 cities in the preceding table (estimated population, 1942, 34,649,200)

	Diphtheria case rates	Encephalitis, infectious, case rates	Influenza		Measles case rates	Meningitis, meningococcus, case rates	Pneumonia death rates	Poliomyelitis case rates	Scarlet fever case rates	Smallpox case rates	Typhoid and paratyphoid fever case rates	Whooping cough case rates
			Case rates	Death rates								
New England	7.5	2.5	5	5.0	775	52.3	132.0	0.0	401	0.0	0.0	132
Middle Atlantic	4.0	0.9	14	8.0	577	35.3	72.4	0.0	161	0.0	1.3	42
East North Central	7.6	0.6	13	5.9	778	25.8	53.3	0.0	263	0.0	4.7	57
West North Central	15.9	0.0	8	17.8	1924	43.6	99.2	0.0	438	0.0	0.0	93
South Atlantic	20.9	0.0	284	15.7	1185	53.9	92.2	0.0	445	0.0	3.5	47
East South Central	23.8	0.0	256	53.6	137	41.7	101.2	0.0	83	0.0	6.0	36
West South Central	35.3	0.0	132	41.2	165	58.8	132.4	2.9	20	0.0	2.9	15
Mountain	32.2	0.0	347	16.1	951	24.2	80.6	0.0	613	0.0	0.0	250
Pacific	8.8	0.0	152	17.5	273	21.0	56.1	0.0	242	0.0	1.8	46
Total	10.6	0.6	66	12.5	745	36.1	77.4	0.2	254	0.0	2.4	59

TERRITORIES AND POSSESSIONS

Panama Canal Zone

Notifiable diseases—December 1943.—During the month of December 1943, certain notifiable diseases were reported in the Panama Canal Zone and terminal cities as follows:

Disease	Panama		Colon		Canal Zone		Outside the Zone and terminal cities		Total	
	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths
Chickenpox	3		2		2				7	
Diphtheria	3	1			2				5	1
Dysentery (amebic)	3		1				3	2	7	2
Dysentery (bacillary)	2				1		3		6	
German measles					42				42	
Malaria [1]	13		2		160		76	2	251	2
Meningitis, meningococcus			1				1		2	
Mumps	18		8		76		3		105	
Paratyphoid fever	2				1		2		5	
Pneumonia (all forms)		10		5	25	4		2	[2] 25	21
Relapsing fever							1		1	
Scarlet fever			2						2	
Tuberculosis		15		8	5	3		12	[2] 5	38
Typhoid fever	1								1	
Whooping cough		3								3

[1] 64 recurrent cases.
[2] Reported in the Canal Zone only.

Correction

In the article "Mortality in large cities, 1943" which appeared on page 209 of the February 11, 1944, issue of Public Health Reports, the first line of the last paragraph should read as follows: "These provisional mortality figures are from tabulations made on the basis of the place of occurrence, and not by place of residence."

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—Week ended January 22, 1944.—During the week ended January 22, 1944, cases of certain communicable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox		9		310	379	80	45	116	202	1,141
Diphtheria	4	10	3	44	15	2	2	2		82
Dysentery (amebic)					6					6
Dysentery (bacillary)				2					9	11
Encephalitis, infectious				1	1					2
German measles				14	17	2	3	7	6	49
Influenza		103	5		268	11			327	714
Measles	1	30		495	326	45	2	198	10	1,107
Meningitis, meningococcus				7	6		1		4	18
Mumps	1	7		78	245	56	6	34	53	480
Poliomyelitis				1						1
Scarlet fever		18	5	98	214	91	25	50	88	589
Tuberculosis (all forms)		4	1	147	59	6		1	12	230
Typhoid and paratyphoid fever		1		9					1	11
Undulant fever				1					1	2
Whooping cough		12		173	127	10	11	6	48	387

CUBA

Provinces—Notifiable diseases—4 weeks ended January 29, 1944.—During the 4 weeks ended January 29, 1944, cases of certain notifiable diseases were reported in the Provinces of Cuba as follows:

Disease	Pinar del Rio	Habana [1]	Matanzas	Santa Clara	Camaguey	Oriente	Total
Cancer	1		8	7	1	6	23
Chickenpox			5				5
Diphtheria		41	2	2		3	48
Hookworm disease		16					16
Leprosy		1				1	2
Malaria	110	11	12	19	26	371	549
Measles	1	24	6				31
Poliomyelitis		1					1
Tuberculosis	20	71	20	34	3	44	192
Typhoid fever	3	50	6	12	3	29	103

[1] Includes the city of Habana.

FINLAND

Notifiable diseases—November 1943.—During the month of November 1943, cases of certain notifiable diseases were reported in Finland as follows:

Disease	Cases	Disease	Cases
Anthrax	1	Paratyphoid fever	102
Cerebrospinal meningitis	9	Pneumonia (all forms)	1,427
Chickenpox	694	Poliomyelitis	30
Conjunctivitis	20	Puerperal fever	66
Diphtheria	3,006	Rheumatic fever	289
Dysentery	4	Scabies	3,275
Gastroenteritis	2,058	Scarlet fever	906
Gonorrhea	571	Syphilis	408
Hepatitis, epidemic	918	Tetanus	1
Influenza	1,149	Typhoid fever	32
Laryngitis	96	Undulant fever	1
Measles	6,741	Vincent's infection	11
Mumps	223	Whooping cough	639

WORLD DISTRIBUTION OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER

From medical officers of the Public Health Service, American consuls, International Office of Public Health, Pan American Sanitary Bureau, health section of the League of Nations, and other sources. The reports contained in the following tables must not be considered as complete or final as regards either the list of countries included or the figures for the particular countries for which reports are given.

CHOLERA

[C indicates cases]

NOTE.—Since many of the figures in the following tables are from weekly reports, the accumulated totals are for approximate dates.

Place		January-November 1943	December 1943	January 1944—week ended—				
				1	8	15	22	29
ASIA								
Ceylon	C	60	-	-	-	-	-	-
China: Kwangsi Province	C	[1] 1,100			-	-	-	-
India	C	278,953	38,480	5,838	-	-	-	-
Bombay	C	28					-	-
Calcutta	C	8,651	297	59	77	67	-	-
Chittagong	C	373	18	-	5	-	-	-
Cochin	C	192	-	-	-	-	-	-
Madras	C	1,091	128	-	9	7	-	-
Negapatam	C	21	-	-	-	-	-	-
Vizagapatam	C	68	-	-	-	-	-	-
India (French)	C	55	-	-	-	-	-	-
Chandernagor	C	8	-	-	-	-	-	-
Karikal	C	30	-	-	-	-	-	-
Pondichery	C	17	-	-	-	-	-	-

[1] Cases reported up to Sept. 8, 1943, with a mortality rate of over 25 percent.

PLAGUE

[C indicates cases; D, deaths; P, present]

Place		January-November 1943	December 1943	January 1944—week ended— 1	8	15	22	29
AFRICA								
Basutoland	C	[1] 23						
Belgian Congo	C	[2] 26	2				3	
Plague-infected rats		P						
British East Africa								
Kenya	C	17	1					
Uganda	C	18	2					
Egypt	C	37	102	31	23	27	11	
Port Said	C	7	3		1			
Suez	C	22	96	31	22	27	11	
French West Africa: **Dakar**	C	32						
Madagascar	C	55	4					
Morocco (French)	C	296	3					
Rhodesia, northern	C				1			
Senegal	C	251						
Union of South Africa	C	69	3	4				
ASIA								
India	C	6 810	1,634	428	453	95		
Indochina	C	31						
Palestine	C	12		1				
EUROPE								
Portugal (Azores).[3]								
SOUTH AMERICA								
Ecuador: Loja Province	C	11						
Peru:								
Ica Department	C	1						
Lambayeque Department	C	2						
Libertad Department	C	17						
Lima Department	C	19						
Lima	C	1						
Plague-infected rats		P						
Piura Department	C	5						
Venezuela	C	10						
OCEANIA								
Hawaii Territory:								
Hamakua District	D	5	2			1		[5] 1
Plague-infected rats		[4] 86	7		2	1		

[1] Includes 12 cases of pneumonic plague in a village south of Mafeteng.
[2] Includes 7 cases of pneumonic plague.
[3] A report dated Nov 19, 1942, states that during 1942 there were 54 cases of plague including 3 pneumonic cases and 2 septicemic cases among the civil population and 2 additional cases among the military population of the Azores. In 1943 the number of cases is about the same as for the year 1942
[4] Includes 4 plague-infected mice.
[5] Pneumonic.

SMALLPOX

[C indicates cases; D, deaths]

Place		January-November 1943	December 1943	January 1944—week ended—				
				1	8	15	22	29
AFRICA								
Algeria	C	1,441	168					
Angola	C	631						
Basutoland	C	146						
Belgian Congo	C	4,186	102					
British East Africa:								
Kenya	C	2,583	856	164	104	241		
Mombasa	C	60	7	5	5	4		
Tanganyika	C	83	60			17		
Uganda	C	82	29	21	32	21		
Dahomey	C	145	11					
Egypt	C	3 476	201	186	149			
French Equatorial Africa	C	127						
French Guinea	C	378						
French West Africa Dakar	C	4					1	
Gold Coast	C	25						
Ivory Coast	C	154	6					
Mauritania	C	40						
Morocco (French)	C	1,008	162					
Mozambique	C	1						
Nigeria	C	5,441	488	203				
Niger Territory	C	284	24					
Rhodesia, northern	C	114	9					
Senegal	C	111						
Sierra Leone	C	3						
Sudan (French)	C	3,684	111	[illegible]				
Tunisia	C	3			1		1	
Union of South Africa	C	717	4					
ASIA								
Arabia	C	1	2			[1] 1		
Ceylon	C	84	1			1		
India	C	41,988	10,295	2,031	4,205			
India (French)	C	10						
Indochina	C	4,823	290		116			
Iran	C	568						
Iraq	C	247	25		1	1		
Palestine	C	104						
Syria and Lebanon	C	1,081	40					
Trans-Jordan	C	19						
EUROPE								
Belgium	C	1						
France	C	2						
Germany	C	1						
Gibraltar	C	1						
Greece	C	403						
Portugal	C	45	5	1	1	1	1	
Scotland	C	[2] 2						
Spain	C	218		3				
Switzerland	C	17						
Turkey	C	10,912						
NORTH AMERICA								
British Honduras	C	1						
Canada	C	6						
Guatemala	C	27						
Mexico	C	336			9	11		10
SOUTH AMERICA								
Brazil	C	56	1					
British Guiana	C	1						
Colombia	C	376	15		4			
Ecuador	C	25						
Peru	D	12				5	14	
Lima	C					5	14	
Venezuela	C	105						

[1] Imported
[2] On a vessel from North Africa

TYPHUS FEVER

[C indicates cases; D, deaths]

Place		January-November 1943	December 1943	January 1944—week ended—1	8	15	22	29
AFRICA								
Algeria	C	8,269	52				39	
Basutoland	C	28						
Belgian Congo	C	39						
British East Africa:								
Kenya	C	4				1		
Mombasa	C	1						
Uganda	C	1						
Egypt	C	40,022	70	120	140			
French West Africa Dakar	C	26	6					
Gold Coast	C	9						
Morocco (French)	C	16,077	114					
Morocco (Spanish)	C	400	1					
Nigeria	C	11						
Mozambique	C	1						
Rhodesia, northern	C	14						
Senegal	C	2						
Sierra Leone	C	3						
Tunisia	C	297	59		6		28	
Union of South Africa	C	3,778						
ASIA								
Afghanistan	C	520						
Arabia: Western Aden Protectorate	C				1	7		
China: Shanghai	C	12						
India	C	1,066						
Iran	C	9,187						
Iraq	C	1,423			1			
Palestine	C	320	20	5				
Syria and Lebanon	C	89	1					
Trans-Jordan	C	17						
EUROPE								
Bulgaria	C	1,822						
France—Seine Department	C	2						
Germany	C	[1] 973						
Greece	C	[2] 30						
Hungary	C	831	135	46			[3] 160	
Irish Free State	C	20						
Netherlands	C	3						
Portugal	C	9	2					
Rumania	C	7,456	985			443	391	
Slovakia	C	597	40		30			
Spain	C	613						
Turkey	C	4,111						
NORTH AMERICA								
Cuba	C	1						
Guatemala	C	1,215	119					
Jamaica	C	31	2					
Mexico	C	1,034						
SOUTH AMERICA								
Brazil	C	1						
Chile	C	233	5	2				
Colombia	D	2						
Ecuador	C	337	5					
Peru	C	15						
Venezuela	C	23						
OCEANIA								
Australia	C	106	12	5	1	5	1	
Hawaii Territory	C	59	7	3	2	1		4

[1] For the period Jan. 1 to Apr. 30, 1943.
[2] For the period Aug. 21 to Oct. 10, 1943.
[3] For 3 weeks.

YELLOW FEVER

[C indicates cases; D, deaths; P, present]

Place		January-November 1943	December 1943	January 1944—week ended— 1	8	15	22	29
AFRICA								
Belgian Congo:								
Bondo	D	3						
Kinzao	D	1						
Leopoldville	C	2						
Stanleyville	D	1						
Yanonge	C	1						
British East Africa: Kenya—Kisumu	C	1						
Dahomey:								
Djougou District	C	[1] 2						
Natitingou	C	[1] 1						
French Guinea:								
Baccoro	C	1						
Dubreka	C	1	1					
Friguiagbe	C	1						
Matakang Island	D	1						
Gold Coast:								
Asuboi	C	1						
Komenda	C		1					
Tamale	C				[1] 1			
Ivory Coast:								
Abidjan	C	1	2					
Aboisso	C		[1] 1					
Bonoua	C		1					
Soubre	C		1					
Toumodi	D	[1] 1						
Portuguese Guinea	C	P	3					
Senegal:								
Goudiri	D	1						
Kolda	C	1						
Tambacounda	C	2						
Velingara Casamance	C	1						
Sierra Leone: Galinas	C		[1] 1					
EUROPE								
Portugal: Lisbon.[2]								
SOUTH AMERICA								
Brazil: Para State	D	1						
Colombia:								
Boyaca Department	D	11	3					
Cundinamarca Department	D	4	3					
Intendencia of Meta	D	7	2					
Santander Department	D	1						

[1] Suspected.
[2] According to information dated January 21, 1944, it is reported that a vessel which called at the islands of Sao Tome and Cape Verde arrived at Lisbon, Portugal, with cases of yellow fever on board.

DEATHS DURING WEEK ENDED FEBRUARY 12, 1944

[From the Weekly Mortality Index, issued by the Bureau of the Census, Department of Commerce]

	Week ended Feb. 12, 1944	Corresponding week 1943
Data for 89 large cities of the United States:		
Total deaths	9,249	9,766
Average for 3 prior years	9,479	
Total deaths, first 6 weeks of year	63,731	60,565
Deaths under 1 year of age	544	692
Average for 3 prior years	578	
Deaths under 1 year of age, first 6 weeks of year	3,735	4,300
Data from industrial insurance companies:		
Policies in force	66,284,960	65,348,380
Number of death claims	14,017	10,847
Death claims per 1,000 policies in force, annual rate	11.1	8.7
Death claims per 1,000 policies, first 6 weeks of year, annual rate	12.3	10.7

X

FEDERAL SECURITY AGENCY

UNITED STATES PUBLIC HEALTH SERVICE

THOMAS PARRAN, *Surgeon General*

DIVISION OF PUBLIC HEALTH METHODS

G. ST. J. PERROTT, *Chief of Division*

The PUBLIC HEALTH REPORTS, first published in 1878 under authority of an act of Congress of April 29 of that year, is issued weekly by the United States Public Health Service through the Division of Public Health Methods, pursuant to the following authority of law: United States Code, title 42, sections 7, 30, 93; title 44, section 220.

It contains (1) current information regarding the prevalence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

The PUBLIC HEALTH REPORTS is published primarily for distribution, in accordance with the law, to health officers, members of boards or departments of health, and other persons directly or indirectly engaged in public health work. Articles of special interest are issued as reprints or as supplements, in which forms they are made available for more economical and general distribution.

Requests for and communications regarding the PUBLIC HEALTH REPORTS, reprints, or supplements should be addressed to the Surgeon General, United States Public Health Service, Washington, D. C. Subscribers should remit direct to the Superintendent of Documents, Washington, D. C.

Librarians and others should preserve their copies for binding, as the Public Health Service is unable to supply the general demand for bound copies. Indexes will be supplied upon request.

UNITED STATES GOVERNMENT PRINTING OFFICE, WASHINGTON : 1944

For sale by the Superintendent of Documents, Washington 25, D. C.

Price 5 cents. Subscription price $2.50 a year

Public Health Reports

VOLUME 59 MARCH 3, 1944 NUMBER 9

IN THIS ISSUE

CONTENTS

Public Health Reports

Vol. 59 • MARCH 3, 1944 • *No. 9*

LOCATION AND MOVEMENT OF PHYSICIANS—METHODS FOR ESTIMATING PHYSICIAN RESOURCES[1]

By ELLIOTT H. PENNELL, *Statistician, United States Public Health Service*

Demands of the war program have crystallized the need for measures by which to estimate the amount of medical care available in a given community. Withdrawal of young physicians from civilian practice, reduction of the normal supply of new physicians, and concentration of population in war industrial areas serve to create additional physician shortages as well as to accentuate those already existing (*1*, *2*). A more precise method for appraisal of present physician resources will facilitate comparison between areas and define the needs for the inadequately staffed community. Moreover, on the basis of such estimates, plans can be formulated for the encouragement of physicians, demobilized after the cessation of hostilities, to establish practice in localities where the need for medical services is most acute.

Earlier papers in this series have dealt with the number and age of physicians in 1923 and in 1938, their proportion in relation to population, the characteristics of the States and counties in which they locate in greater or in lesser numbers, and facts concerning their migrations. From such studies it is evident that even in time of peace there is great disparity between the number of physicians serving one community and those available to the people of another. In general, the wealthiest communities enjoy exceptionally generous provisions for medical care and attract large numbers of young physicians. Illness studies (*3*, *4*, *5*, *6*, *7*, *8*), on the other hand, reveal the greater number of medical problems among the economically

[1] From the States Relations Division. Assistance in the preparation of these materials was furnished by the personnel of Work Projects Administration Official Project No. 165-2-23-300. The author wishes to express his grateful appreciation to Medical Director Joseph W. Mountin for suggestions which led to the initiation of this study and for advice and assistance in the development of the final manuscript.

This is the fifth report in a series on the location and movement of physicians.

Previous papers in this series are:

Mountin, Joseph W., Pennell, Elliott H., and Nicolay, Virginia: Location and movement of physicians, 1923 and 1938—general observations. Pub. Health Rep., 57:1363 (September 11, 1942). Reprint No. 2403.

Mountin, Joseph W., Pennell, Elliott H., and Nicolay, Virginia: Location and movement of physicians 1923 and 1938—turn-over as a factor affecting State totals. Pub. Health Rep., 57:1752 (November 20, 1942). Reprint No. 2422.

Mountin, Joseph W., Pennell, Elliott H., and Nicolay, Virginia: Location and movement of physicians, 1923 and 1938—effect of local factors upon location. Pub. Health Rep., 57:1945 (December 18, 1942). Reprint No. 2434.

Mountin, Joseph W., Pennell, Elliott H., and Nicolay, Virginia: Location and movement of physicians, 1923 and 1938—age distribution in relation to county characteristics. Pub. Health Rep., 58:483 (March 19, 1943). Reprint No. 2465.

underprivileged. It would seem, therefore, that in normal times concentration of physicians is correlated with financial ability to purchase care rather than with the need for care. Such inequalities in physician service among the various communities will doubtless continue to develop unless planned use of physician resources is instituted and money is available to insure a fair return to physicians rendering the service.

There has long been need of some instrument of measurement by which current and future medical resources might be estimated from base-year studies. The purpose of this paper is to demonstrate the application of life table techniques to the problem of projecting available physician totals to make estimates of future professional resources. In course of the presentation constants are developed for the adjustment of these estimates to take into account the retirement of physicians as age advances and to translate the resulting adjusted physician totals in terms of service equivalents.[2] Finally, average future full-service years are computed for physicians at different age levels and correspond to their average future life expectancy translated in terms of service equivalents.

A SURVIVAL PATTERN FOR PHYSICIANS

Fundamental to the problem of projecting from base-year studies totals that will provide estimates for both current and future years is the development of indexes which show the fraction of physicians counted in a base year who may be expected to survive until some specified future date. While factors such as change of occupation and movement to locations outside the country affect the final number remaining, mortality, more than any other factor, accounts for the major share of the changes which occur in normal times.[3] Accurate

[2] "Service equivalent" as used in this article is defined as the decimal fraction obtained by dividing the average weekly number of patients seen by a physician of designated age by the corresponding number seen by a physician at the peak of his career. Data presented in a later section reveal that the average general practitioner at ages 38 to 40 sees more patients than at any other time in his career. By taking patients seen as a measure of service capacity, it is assumed that a physician at this age represents one full-service-year equivalent. At age 64, for example, the fraction becomes 0.5 so that at this age the physician represents only one-half of a full-service equivalent. It then follows that a full-service year would be reflected by the 12 months' work of one physician at ages 38 to 40 whereas at age 64 it would take two physicians working 12 months each or one for 24 months to provide one full year of service. Throughout this paper the phrases "service capacity" and "service equivalent" are used interchangeably.

[3] In a report on the distribution of physicians in the United States, Leland (9) points out that "old age and death are the two most important factors in eliminating physicians." While emphasizing the lack of dependable data concerning the annual number of deaths in the medical profession he estimates, on the basis of obituaries published in the Journal of the American Medical Association, that the annual number "is somewhat in excess of 3,000, possibly as high as 3,500."

Even the upper limit of Leland's estimate is considerably below that used by the Council on Medical Education and Hospitals (10) in their presentation of licensure statistics in the April 25, 1936 issue of the Journal. In this report the statement is made that "altogether 5,500 were added to the profession as contrasted with approximately 4,000, the number removed by death in 1935."

The physician data prepared for this study reveal that there were approximately 57,000 physicians, or an average of about 3,800 per year, who were lost from the profession during the period 1923 to 1938. While it

age-specific death rates for physicians, if available, would provide indexes by means of which estimated losses from physician groups in selected age categories might be computed. The paucity of such data, however, has led the author to use for this purpose the survival table [4] represented in the stationary population of the 1930-39 life table for white males, published by the United States Bureau of the Census (*11*). In light of the findings by Dublin and Lotka (*12*) that life expectancy for physicians at different ages is not far different from that for white males, it is believed that the survival table used is generally descriptive of the mortality experience of physicians.

An assumed stationary population forms the central concept of the life table. This population is derived mathematically from the number who will survive at each future age from 100,000 infants if they are subject year by year throughout life to the mortality rates over some designated period. To the generation so determined there is added each year another generation of 100,000 births subject to the same limiting definitions, until a stable population is reached. In such a mathematically derived stable population the number in each age group will not change with time provided there is no migration and the number of births and deaths are distributed evenly over the calendar year. Naturally, the resulting distribution may not correspond to any actual population group, but it does represent a standard from which the proportion surviving in future years from any designated year of age in some observed population may be computed. However, this premise is based upon the assumption that the future mortality experience of this observed population will correspond reasonably well with that used as a base in the development of the stationary population. The procedure may be extended also to categories broader than single years of age where the distribution within the broad interval for the observed population is essentially the same as that for the corresponding interval in the stationary population.

The stationary population shown in table 6, column 2 (appendix A), is taken directly from the life table for white males published by the Census Bureau (*11*). This population was mathematically derived on the basis of the mortality experience for white males during the period 1930–39. Only that portion of the table covering the age range in which physicians are most commonly found is reproduced.

For purposes of this paper the proportionate change over a given

is not possible from data at hand to determine the factors affecting these losses, the intermediate position of this annual figure between the estimates referred to above suggests that death was the major factor in the removal of physicians during the study period.

[4] The data in this table are preliminary and are based upon a 5-percent cross section of the 1940 Census. The Census Bureau emphasizes further that "basic data for both white and nonwhite populations at ages over 85 or 90 may be subject to relatively serious errors, and for these ages the life table values must be considered only as reasonably reliable estimates." However, it is believed that the numbers so involved are relatively too small for such errors to affect materially estimated totals for most local areas.

period in the stationary population for white males will be used as an index by which change over the same interval in observed physician totals may be predicted. For example, the stationary population for white males (table 6, col. 2) shows 83,415 white males at age 40 and 75,341 at age 51. The rate of survival obtained by dividing the number of white males in the older group by the number in the younger is 0.903.

This survival index may be applied to any given number of physicians who are 40 years of age in order to predict the most likely number of the group who will be alive 11 years later. That is, when the survival ratio found from the stationary population for white males is applied to a group of 50 physicians all of whom are 40 years of age, the results show that 45 of the physicians may be expected to survive the 11-year period.

The principle for computing survival ratios demonstrated above is expressed mathematically in formulas 1 and 3 of appendix B. By substituting appropriate figures in the latter from both the stationary population and the actual physician population, the number of survivors from any year of age may be determined for a specified future date.

Prediction of survival for physicians classified by single years of age is the most efficient means of estimating future physician resources. However, it may be that age distributions for physicians in study areas are not available by single years but rather have been compiled in 2-year, 5-year, or even in 10-year age groups. In this event, the numbers appearing opposite appropriate years of age in the stationary population must be grouped into age intervals exactly corresponding to those for the actual physician population. The summary survival rate [6] over any given period is then obtained by dividing the total for the age group in the stationary population corresponding to that in which the surviving physicians will be at the specified future date by the total for the age group corresponding to that in which they are at present. For illustration: In a certain city there are 50 physicians in the age group 45–49. How many of these will survive 5 years hence, at which time their ages will range from 50 to 54? The survival rate is obtained by simply dividing the total for the 50–54 age group in the stationary population by the total for the age group 45–49 in the same population—i.e., from table 4, column 2, as follows:

[6] Ratios reflecting proportional survival represent exact mathematical relationships between totals for selected age groups in the stationary population. They can, therefore, be applied with precision only to those populations whose mortality experience over the projecting interval coincides with that shown by the age-specific death rates for white males over the period 1930-39. Moreover, the distribution within the selected age category of the study group must correspond with that for the stationary population. In practice, however, application of these rates to enumerated totals for age groups of not too great extent (perhaps even up to 10 or 15 years) will provide reasonable estimates if it may be assumed that the future mortality of the study group will closely approximate that for the stationary population.

Year of age	Number in stationary population	Year of age	Number in stationary population
45–46	80,435	50–51	76,328
46–47	79,715	51–52	75,341
47–48	78,947	52–53	74,292
48–49	78,128	53–54	73,181
49–50	77,256	54–55	72,010
Total	394,481	Total	371,152

$$\text{Survival rate: } \frac{371{,}152}{394{,}481} = 0.941$$

Thus, the survival rate for the 5-year period is 0.941. Application of this rate to the 50 physicians in the actual physician population indicates that 50 × 0.941 or 47 of the 50 physicians in this age group, 45–49, may be expected to be alive 5 years hence.

The procedure followed above is summarized in formula 2 which may be used to obtain survival rates for any age interval. By substitution in formula 4 it is possible to compute directly the number of physicians of any known age who might be expected to remain alive over a given period.

Through application of formula 2, already referred to, survival indexes for the most commonly used age intervals are derived. These constants, presented in table 1, represent fractions of given groups of physicians who will survive 1 year, 3 years, 5 years, and 10 years hence. By use of this formula, constants may be developed for intervals of different size to estimate physician survival for any desired number of years in the future.

TABLE 1.—*Stationary population for white males based upon 1930–39 mortality and the decimal fraction of those in 5-year age intervals who may be expected to survive in designated future years (based upon data from table 4)*

Age interval	1930-39 stationary population for white males in age interval	Fraction of population in age interval who may be expected to survive in designated future years			
		1 year hence	3 years hence	5 years hence	10 years hence
(1)	(2)	(3)	(4)	(5)	(6)
x to $x+5$ or X	L_x	$\frac{L_{x+1}}{L_x}$	$\frac{L_{x+3}}{L_x}$	$\frac{L_{x+5}}{L_x}$	$\frac{L_{x+10}}{L_x}$
25–29	441,201	0.997	0.990	0.983	0.961
30–34	433,619	.996	.987	.978	.949
35–39	424,047	.995	.983	.970	.930
40–44	411,492	.993	.977	.959	.902
45–49	394,481	.990	.967	.941	.862
50–54	371,152	.985	.953	.917	.808
55–59	340,191	.979	.933	.881	.731
60–64	299,775	.969	.902	.829	.627
65–69	248,622	.954	.857	.756	.495
70–74	188,007	.931	.793	.655	.344
75–79	123,060	.897	.702	.526	.208
80 and over	96,997	.823	.538	.333	.076

RETIREMENT FROM PRACTICE

Simple counts of physicians are frequently used to portray the extent of professional resources in an area. It should be recognized, however, that such totals provide only approximations to the number of physicians in active practice.

Some insight into the limitation of such totals for measuring the number of physicians participating in the care of sick patients is revealed by analyses prepared by the Directory Department of the American Medical Association (*13*). According to the fifteenth edition of the American Medical Directory, only 137,688, or slightly more than four-fifths, of the 1938 physicians are reported in private practice. An additional 9 percent are listed as interns, residents, or as otherwise devoting the greater part of their time to hospital service. Though not in private practice 2.5 percent of the physicians engage in public health or other work of a professional character, while about the same percentage serve the Federal government. The remaining group of physicians—about 5 percent of the total—are retired or are not in active practice.

Obviously, any correction used to eliminate from gross totals the number of physicians not actively engaged in medical practice will provide a more nearly correct picture of the number who can presumably be drawn upon to provide medical services in a given area. On the other hand, in the appraisal of professional resources, not only hospital physicians but also many engaged in work of a professional character other than private practice must be considered as important assets to the communities where they are located. Many of these physicians in normal times would doubtless take up the private practice of medicine within a few years.

The situation concerning physicians designated as retired and not in practice is entirely different. These physicians are, for the most part, advanced in years and, whether retirement was voluntary or the result of disability associated with age, their capacity for service has generally been greatly curtailed. The high degree of association of this phenomenon with advancing age makes desirable some adjustment of the survival table (stationary population) described in the previous section. This table may be adjusted so that it becomes a survival table for active individuals only. It is then possible, on the basis of findings from base-year studies, to estimate the probability of a physician being active in a current or future year.

Although published data showing the age distribution of physicians retired or not in practice in 1938 are not available, such an analysis has been prepared by this office on the basis of the 1940 American Medical Directory (*14*). Search of the Directory reveals nearly 10,000 physicians in this category. The number of "active" physicians

in any given age category is obtained by subtracting from the total for the age group the number designated as "retired" and "not in practice." Comparison of the resulting total with the 1940 United States Census count of gainfully employed physicians (*15*) indicates that the Directory totals for active physicians at the older age levels are considerably in excess of the number reported as gainfully employed at the time of the Census enumeration. On the other hand, a larger number of gainfully employed young physicians were reported by the United States Census than are listed in the Directory. It seems likely that many older physicians fail to inform the Directory of their retirement, whereas at the younger age levels some of those reporting to the Census as being gainfully employed may not have met the requirements for a Directory listing in 1940.

To avoid confusion between active physicians and the degree of their activity, all physicians listed by the Directory but not designated as either "retired" or "not in practice" will henceforth be termed "gainfully employed" for purposes of this paper. Totals for gainfully employed physicians in each 5-year age group are divided by the total for all physicians in the corresponding age interval to obtain the "fraction gainfully employed" at each 5-year age level. The fractions are then plotted above an age scale. From the resulting curve the fraction gainfully employed in each year of age is read and the figures are given in table 5, column 2.

This fraction gainfully employed is essential both to the calculation of physicians presently employed and also to the estimations of survivors who will be employed at some future time. These constants are applicable to any physician population in which employment status is not known for determining the number gainfully employed. For example, the table reveals that 95 percent of the physicians are still gainfully employed at age 55. Therefore, application of this index to a group of 20 physicians who are 55 years of age indicates that 19 would be the most reasonable estimate of the number gainfully employed.

Estimation of fraction gainfully employed for other than single years of age makes necessary some assumption of a standard age distribution which may be applied over the interval so that average values may be computed. For this purpose, the fractions gainfully employed, for each year of age, are applied to the appropriate totals in the stationary population to provide a gainfully employed stationary population (table 6, col. 4). This gainfully employed population possesses the same attributes as characterize the original stationary population except that the totals correspond to gainfully employed physicians only. A fraction gainfully employed to be applied to physician totals for any age group may then be obtained simply by dividing the total

572605°—44——2

in the gainfully employed stationary population for that age interval by the corresponding total in the stationary population. The procedure to be followed in translating numbers of unqualified physicians for any age interval to estimated numbers of employed physicians is given in formula 5.

A PHYSICIAN'S CAPACITY FOR SERVICE

Not only do the physicians per unit of population in one community surpass those of another, but there is also great variation among physicians as to the volume of service that each is able to render. For this reason a count of all physicians or even of those considered as gainfully employed in the practice of medicine represents at best a crude index to the volume of medical services available in a given community. Many physicians, though still active, may have reached so advanced an age that their service capacity is greatly reduced. Likewise, the patient load of younger practitioners in their early years is considerably less than that of physicians in their prime.

Although there is general agreement that age is an important factor in determining the service capacity of the average physician, only recently has it received attention in published figures. Leven (*16*) points out that the amount of idle time consumed in establishing practice represents a complete loss of at least 2 full years for the average physician. He finds that the first 7 years are characterized by a low financial return. Between the eighth and thirty-fifth years, income of physicians is above the average for all years. If practice is continued after this period the income again becomes subnormal. Diminished professional activity associated with advanced age is recognized by the Central Board of Procurement and Assignment Service for Physicians, Dentists, and Veterinarians, a division of the War Manpower Commission (*17*). In testimony before the Senate Subcommittee on Education and Labor dealing with medical manpower, Dr. Lahey stated that the 29,000 private physicians in this country between the ages of 65 and 102 are considered arbitrarily as being 33 percent efficient. Therefore, the appraisal of medical resources in an area or comparison between areas might become more meaningful if physician totals were translated into some standard service equivalent which takes into account the ages of the physicians serving the area.

Average gross income figures prepared by Leland (*18*) or even net income data published by the Department of Commerce (*19*, *20*) might be used to develop more specific indexes of professional activity. Although physicians' income figures presented by Leland build up more slowly than do those shown by the Department of Commerce, both of these bodies of data reveal that income builds up from a low figure in the early years of practice to a maximum approximately 20

years later. After this a gradual decline occurs in the average income for physicians which is accelerated in the more advanced age groups. However, Ciocco, Pond, and Altman (*21, 22, 23, 24*) have developed criteria based on the patient loads of physicians in private practice which provide a more direct method for evaluating the service capacity of physicians at different age levels. In recent articles based on studies for the Procurement and Assignment Service these authors point out differences in numbers of patients carried by private practitioners of various ages. Their data verify the apparent fact that communities with equal numbers of physicians do not necessarily have the same facilities for medical care. For example, in a community where all physicians are over 65 years of age there is less service available than in a community of comparable size where an equal number of physicians are under 50.

By contrasting Ciocco's data [6] with those on income, it is evident that numbers of patients seen by active general practitioners build up to a maximum more quickly than income. Comparison of the patient load and income curves plotted by age of physician reveals a remarkable similarity in pattern. The income curve, however, shows a lag of some 5 to 8 years in the age at which the maximum is attained.

The activity of an average private practitioner reaches a peak of approximately 170 patients per week at about age 40. After the peak is reached the physician faces with the advancing years a continuous decline in patient load. By reducing values for average weekly patient load at each 5-year age level to relatives, with the maximum—170 patients at age 40—as unity, a series of adjustment decimal fractions are provided which reflect change in activity with age. When these data are plotted over an age scale and a smooth curve is fitted thereto, approximate measures of a physician's capacity for service at each year of life may be read from the curve.

Index values obtained through this procedure (table 5, col. 3) are interpreted as representing approximate service-year equivalents and reflect, as indicated in the table captions, "fraction service capacity" for gainfully employed physicians. This presupposes, of course, that a physician's service contribution in a community is proportional to the number of patients seen per week by the average gainfully employed physician at that age. In fitting the curve for patient load by age of physicians (fig. 1) it is assumed that no service is rendered in private practice by physicians under 25 years of age. A physician 25 years old renders service equivalent to approximately one-tenth of the maximum service that he will render in his fortieth year of age. The fraction reaches one-fourth when he is 26, one-half at age 28, three-fourths when he is 31, and 100 percent before he is 40. The

[6] The data used as the basis for these procedures represent unpublished numbers of patients seen per week by physicians in 5-year age intervals for the States of Maryland and Georgia.

decline is somewhat more gradual. The fraction reaches three-fourths when he is 53 years of age, one-half at 64 years, one-fourth at age 75, and drops below 10 percent at age 84.

Interpretation of professional equivalents for private practitioners under 30 years of age is subject to a number of qualifying factors Physicians graduate in no fixed year of life; consequently, there is considerable variation as to the age at which they enter private practice.[7] This, in turn, renders difficult any attempt to estimate the

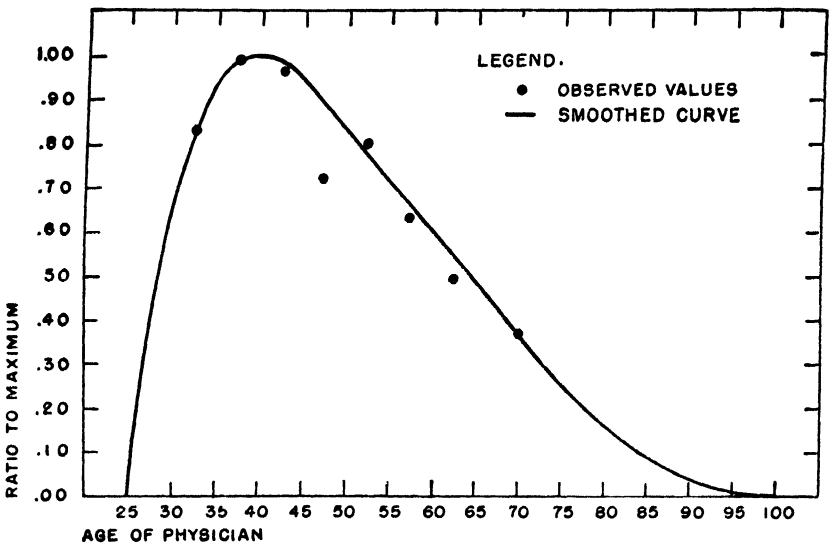


FIGURE 1 —Smooth curve portraying relative number of patients seen in a week in 1942 by active physicians of different ages engaged in private practice (Number seen at age 40 equals 1 00)

amount of service furnished by an average physician under 30. Again, data supplied by the private practitioners under 30 cannot be considered as representative of those for all physicians of the age group. In 1940 more than half of the 19,000 physicians less than 30 years old were engaged in hospital service, presumably in an intern or resident capacity. The fraction so classified varied from 83 percent of those 25 years of age to about 27 percent of those at age 29. Beyond these ages the fraction in hospitals represents only a minor part of the total. Naturally, services of these hospital physicians cannot be included in any estimate of average patient load for private practice. Finally,

[7] Data tabulated for physicians listed one or more times during the 15-year period from 1923 to 1938 indicate that the average age of physicians graduated in the years 1925 through 1936 was about 27 years. However, more than one-fourth of these physicians were under 25 at the time of their graduation An additional one-fourth graduated at age 25 Three-fourths of all medical students had completed their medical school course before reaching their twenty-eighth birthday. Throughout the years changes in the age span including the middle 50 percent of all graduates indicate a tendency for the disparity between ages at graduation to decline. The interquartile range of ages for those graduated in 1923 covered a span of 3 5 years as contrasted with a span of 2 7 years for those graduated in 1936 Inspection of the age distribution for each year indicated that both the median and the average age at graduation were slightly lowered during the period Under stress of war needs these tendencies have doubtless been accelerated.

young physicians do not as a rule acquire a capacity practice as soon as they finish their training. There is a period of several years over which practice is expanded to its peak. These factors are considered in sketching the younger age intervals on the patient-load curve for physicians as shown in figure 1.

The average private practitioner even up to age 38—the beginning of the peak period—possesses a service potential fully as great or perhaps greater than does a physician between the ages of 38 and 40. Yet, under conditions of competitive practice he is not fully occupied with private patients before the latter period. Nevertheless, in normal times these young physicians are potentially available for more complete utilization.

As the indexes read from figure 1 (tabulated year by year in table 5, col. 3) are based on reports from gainfully employed physicians, they may be used to measure the service capacity of that part of the physician population only. To obtain constants that are applicable to all physicians, the fraction service capacity for each year of age is multiplied by the fraction gainfully employed in the same age category. The resulting series of fractions represents an estimation of the service capacity of an average physician at each year of life when employment status is not known (table 5, col. 4).

If the ages of physicians in an area are known by single years, their combined service capacity may be found at once through the summation of values obtained by applying the appropriate index to the number of practicing physicians in each year of age. For example, in a community there might be eight physicians of unknown employment status whose ages are distributed by years as follows: 29, 40, 50, 50, 64, 64, 64, 79. When the number of physicians in each of the age categories is multiplied by the fraction representing service capacity for that age and the totals summated, results show that actually the eight physicians of various ages have a total service capacity equal to only 4.62 full-service physicians at age 40.

Year of age	Number of physicians	Fraction service capacity	Number of full-service-capacity physicians represented
29	1	0.59	0.59
40	1	.99	.99
50	2	.79	1.58
64	3	.45	1.35
79	1	.11	.11
Total	8		4.62

In the above example employment status is unknown and the fraction service capacity for all physicians is used (table 5, col. 4). Had the physicians all been gainfully employed, the fraction depicting

service capacity for gainfully employed physicians would have applied (table 5, col. 3). In that case the total service equivalent for the eight physicians would have been 4.88 full-service physicians.

Obviously, the most precise evaluation of professional resources is determined by selecting appropriate service-equivalent ratios from the year-by-year table in the appendix, multiplying by the actual number of physicians in each year of age, and summating the figures so obtained. As the number of physicians in an area becomes large, however, essentially equivalent results will be found for age intervals of not too great extent by application of summary fractions.

Such summary fractions—service equivalents for other than single years of age—are computed in much the same manner as were the summary fractions for estimating the number gainfully employed. First, a service-equivalent stationary population is obtained by applying the decimal service equivalent value for each year of age (table 5, col. 4) to the total for the appropriate year of age in the gainfully employed stationary population (table 6, col. 4). Service equivalent fractions may then be computed for any desired age interval by taking the total for the age interval from this service-equivalent stationary population and dividing it by the total for the corresponding age group in the stationary population. Following this principle, table 2 is compiled to give a series of summary fractions representing the fraction of physicians who are gainfully employed,

TABLE 2.—*Decimal fractions developed from data presented in table 6 for use in projecting gainfully employed and service equivalent totals from physician counts distributed by 5-year age groups*

Age interval	Fraction gainfully employed in age interval	Fraction service capacity of gainfully employed individuals in age interval	Fraction service capacity of all individuals in age interval
(1)	(2)	(3)	(4)
x to $x+5$ or X	$\frac{L'x}{Lx}$	$\frac{L''x}{L'x}$	$\frac{L''x}{Lx}$
25–29	1.00	0.36	0.36
30–34	1.00	.81	.81
35–39	.99	.98	.97
40–44	.98	.98	.96
45–49	.98	.89	.87
50–54	.97	.77	.74
55–59	.95	.66	.62
60–64	.92	.54	.50
65–69	.88	.43	.38
70–74	.81	.31	.25
75–79	.71	.22	.15
80 and over	.51	.11	.06

the fraction service capacity of gainfully employed and the fraction service capacity of all physicians for each 5-year age interval. For example, table 2 shows that the average fraction service capacity of all physicians in the age group 55–59 years is 0.62. This fraction is

obtained by dividing the total (table 6, col. 6) for the age group 55–59 in the service-equivalent stationary population by the total for the same age group in the total stationary population (table 6, col. 2) as follows:

Year of age	Number in service-equivalent stationary population	Number in stationary population
55–56	47,066	70,776
56–57	44,883	69,478
57–58	42,707	68,114
58–59	39,485	66,674
59–60	37,356	65,149
Total	211,497	340,191

Fraction service capacity: $\frac{211,497}{340,191}=0.62$

Other summary constants can be computed in like manner for age intervals of different size that coincide more nearly with data at hand. Such summary indexes will doubtless be used in the solution of most evaluation problems as distributions by single years of age are seldom available. When the fraction 0.62 is applied to an unqualified total of 19 physicians in the age group 55–59 ($19\times0.62=11.78$) the findings show that the 19 physicians are equivalent to about 12 full-service-capacity physicians at age 40. This method for conversion of unqualified physician totals in a specified age category to service equivalents is summarized in formula 6. Where physician totals are confined to employed physicians, similar conversions may be made by application of formula 7.

AVERAGE FUTURE EXPECTANCY

Procedures outlined in the preceding sections make possible both the projection of physician totals obtained from base-year studies to current and future years and the translation of such totals so as to take into account the significance of retirement and differences in service capacity associated with advancing age. In addition, the stationary populations derived for these purposes have properties which make possible the estimation of average future expectancies per physician. From a stationary population, average future years of life—commonly spoken of as life expectancy—may be computed for individuals in any year of age. In table 7 are presented data showing the total future years of life for all individuals in the stationary population by single years of age, corresponding totals adjusted to eliminate years of retirement, and, in a final section, the service equivalent of all remaining years of life. Division of these totals by the corresponding totals in the stationary population provides measures of average future years of life, average future years of gainful employment, and average service capacity years per individual.

These average expectancy values may be used to estimate the total potential resources for future years reflected in physician totals as of a given date, provided that no replacements are made and that all losses are measured by mortality rates for white males over the period from 1930 to 1939.

Reference to table 5, column 3, reveals that while the service equivalent value of an employed physician at age 30 under the prevailing system of practice is roughly that of a physician at age 56, an estimate of the future service that the younger physician may be expected to render throughout the balance of his career will be greatly in excess of that for the older man (table 7). At the former age a physician may expect to live 38 years, he may practice 35 years, and his service will be equivalent to 26 full-service years. At age 56, on the other hand, he may expect to live only 17 years, he will remain active for 15 years, and the full-service equivalent of his remaining practice will be only 7 years. Thus, the future service capacity is 3.7 times as large for the former as for the latter physician.

The future years of life, the future years of gainful employment, and the future years of maximum service are summarized by 5-year age intervals in table 3. Obviously the facilities represented by an individual physician are constantly changing with age, and his future professional expectancy may be thought of as continuously and progressively depreciating with advancing years. The future expectancy for service in a community, therefore, depends not only on the number of physicians located therein, but also—and to a very important degree—upon the age of the physicians making up the total.

TABLE 3.—*Average expectancy for years of life, years of gainful employment, and years of service capacity developed from data presented in tables 6 and 7 for estimating over-all resources for future years from physician counts distributed by 5-year age groups*

Age interva	Average future years remaining to individuals in age interval			Average future years remaining to gainfully employed individuals in age interval	
	Years of life	Years of gainful employment	Years of service capacity	Years of gainful employment	Years of service capacity
(1)	(2)	(3)	(4)	(5)	(6)
x to $x+5$ or X	$\frac{T_x-\frac{1}{2}L_x}{L_x}$	$\frac{T'_x-\frac{1}{2}L'_x}{L_x}$	$\frac{T''_x-\frac{1}{2}L''_x}{L_x}$	$\frac{T'_x-\frac{1}{2}L'_x}{L'_x}$	$\frac{T''_x-\frac{1}{2}L''_x}{L'_x}$
25–29	40.2	37.7	27.2	37.7	27.2
30–34	35.9	33.3	24.7	33.4	24.7
35–39	31.7	29.0	20.6	29.3	20.8
40–44	27.5	24.9	16.3	25.3	16.5
45–49	23.6	21.0	12.3	21.5	12.6
50–54	19.9	17.3	8.9	17.9	9.2
55–59	16.5	13.8	6.1	14.6	6.5
60–64	13.4	10.7	3.9	11.6	4.3
65–69	10.6	7.9	2.3	9.0	2.6
70–74	8.2	5.5	1.2	6.8	1.5
75–79	6.2	3.6	.5	5.1	.8
80 and over	4.2	1.8	.1	3.5	.3

SUMMARY

Findings by various groups working with problems of medical care in this country make it apparent that a plain numerical count of physicians does not provide a true picture of available resources. Existing data indicate that the number of patients seen per week by an average physician in private practice declines steadily after age 40. Furthermore, relatively few physicians formally retire until they are well advanced in age, although in many instances their activities so decline in the later years of active practice that their service contribution is very limited. In planning for the future, gross counts of physicians are of even less value because future expectancies for both total and professional years of life decline sharply with advance in age.

In this study, retirement and change in professional capacity associated with the aging of physicians are explored to determine their bearing on current estimates of resources. Life-table techniques are utilized to evaluate quantitatively their cumulative effect over a period of years.

The results of the investigations outlined are summarized as a series of formulas for use in measuring physician resources of a community at any given time.

REFERENCES

(*1*) Office of War Information: Doctor shortage and civilian health in wartime. J. Am. Med. Assoc., **123**:214-219 (Sept. 25, 1943).

(*2*) Perrott, G. St. J., and Davis, Burnet M.: The war and the distribution of physicians. Pub. Health Rep., **58**:1545-1554 (Oct. 15, 1943).

(*3*) Sydenstricker, Edgar: Economic status and the incidence of illness. Hagerstown Morbidity Studies No. X. Pub. Health Rep., **44**:1821–1833 (July 26, 1929). Reprint No. 1303.

(*4*) Falk, I. S., Klem, M. C., and Sinai, N.: The incidence of illness and receipt and costs of medical care among representative families. Publication No 26 of the Committee on the Costs of Medical Care. University of Chicago Press, 1933.

(*5*) Britten, R. H.: The National Health Survey: Receipt of medical services in different urban population groups. Pub. Health Rep., **55**:2199–2224 (Nov. 29, 1940). Reprint No. 2213.

(*6*) Disability from specific causes in relation to economic status. Preliminary Reports, Sickness and Medical Care Series, Bulletin 9, National Health Survey, 1935–1936, U. S. Public Health Service, 1938 (Processed).

(*7*) Perrott, G. St. J.: Income and health. Plan Age, **4**:34–38 (February 1938).

(*8*) Illness and medical care in relation to economic status. Preliminary Reports, Sickness and Medical Care Series, Bulletin 2, National Health Survey, 1935–1936, U. S. Public Health Service, 1938; revised 1939 (Processed).

(*9*) Leland, R. G.: Distribution of Physicians in the United States. Bureau of Medical Economics, American Medical Association, Chicago, 1936.

(*10*) Council on Medical Education and Hospitals: Medical licensure statistics for 1935. J. Am. Med. Assoc., **106**:1475–1494 (Apr. 25, 1936).

(*11*) United States life tables 1930–1939 (preliminary); For white and nonwhite by sex. U. S. Bureau of the Census (July 21, 1941).

(*12*) Dublin, Louis I., and Lotka, Alfred J: Length of Life—a Study of the Life Table, p. 226. The Ronald Press, New York, 1936.

(*13*) Directory Department American Medical Association: Number of physicians in the United States by county. American Medical Association, Chicago, 1938.

572605°

(14) American Medical Directory, sixteenth edition, 1940. Chicago.
(15) Sixteenth Census of the United States: 1940 Population, Series P-16, No. 6, Table 1. U. S. Bureau of the Census (December 14, 1942).
(16) Leven, Maurice: The income of physicians—an economic and statistical analysis. Publication No. 24 of the Committee on the Costs of Medical Care. University of Chicago Press, 1932.
(17) Investigation of Manpower Resources. Hearings before a subcommittee of the Committee on Education and Labor, United States Senate, Seventy-seventh Congress, second session, on S. Res. 291.
(18) Leland, R. G.: Income from medical practice. J. Am. Med. Assoc., **96**: 1683–1691 (May 16, 1931).
(19) Income of independent professional practitioners. Survey of Current Business, U. S. Dept. of Commerce, **4**:12–16 (April 1938).
(20) Denison, Edward F., and Stater, Alvin: Income in selected professions, part IV, medical service. Survey of Current Business, U. S. Dept. of Commerce, **23**:16–20 (October 1943).
(21) Ciocco, Antonio, Pond, Alan, and Altman, Isidore: A survey of practicing physicians in Washington. Med. Annals, District of Columbia, **11**:454–457 (November 1942).
(22) Ciocco, Antonio, and Altman, Isidore: Statistics on the patient load of physicians in private practice. J. Am. Med. Assoc., **121**:506–513 (Feb. 13, 1943).
(23) Ciocco, Antonio, and Altman, Isidore: Withdrawal of physicians in private practice in Georgia. J. Med. Assoc. of Georgia, 4·104–107 (April 1943).
(24) Ciocco, Antonio, and Altman, Isidore: The patient load of physicians in private practice—a comparative statistical study of three areas. Pub. Health Rep., **58**:1329–1351 (Sept. 3, 1943).

Appendix A—Tables

TABLE 4.—*Stationary population for white males based upon 1930–39 mortality and the decimal fraction of those in single years of age who may be expected to survive in designated future years*

Year of age	1930–39 stationary population for white males in year of age	Fraction of population in year of age who may be expected to survive in designated future years			
		1 year hence	3 years hence	5 years hence	10 years hence
(1)	(2)	(3)	(4)	(5)	(6)
x to $x+1$	L_x	$\frac{L_{x+1}}{L_x}$	$\frac{L_{x+3}}{L_x}$	$\frac{L_{x+5}}{L_x}$	$\frac{L_{x+10}}{L_x}$
25–26	88,795	0 997	0.991	0.984	0 965
26–27	88,522	.997	.990	.984	.963
27–28	88,246	.997	.990	.983	.961
28–29	87,964	.997	.990	.982	.959
29–30	87,674	.997	.989	.981	.957
30–31	87,374	.996	.989	.980	.955
31–32	87,063	.996	.988	.979	.952
32–33	86,740	.996	.988	.978	.949
33–34	86,401	.996	.987	.977	.946
34–35	86,041	.996	.986	.975	.943
35–36	85,661	.995	.985	.974	.939
36–37	85,258	.995	.984	.972	.935
37–38	84,832	.995	.983	971	.931
38–39	84,384	.994	.982	.969	.926
39–40	83,912	.994	.981	.967	.921
40–41	83,415	.994	.980	.964	.915
41–42	82,890	.993	.979	.962	.909
42–43	82,334	.993	.977	.959	.902
43–44	81,742	.992	.975	.956	.895
44–45	81,111	.992	.973	.952	.888
45–46	80,435	.991	.971	.949	.880
46–47	79,715	.990	.969	.945	.872
47–48	78,947	.990	.967	.941	.863
48–49	78,128	.989	.964	.987	.853
49–50	77,256	.988	.962	.932	.843

TABLE 4.—*Stationary population for white males based upon 1930–39 mortality and the decimal fraction of those in single years of age who may be expected to survive in designated future years*—Continued

Year of age	1930–39 stationary population for white males in year of age	Fraction of population in year of age who may be expected to survive in designated future years			
		1 year hence	3 years hence	5 years hence	10 years hence
(1)	(2)	(3)	(4)	(5)	(6)
x to $x+1$	L_x	$\frac{L_{x+1}}{L_x}$	$\frac{L_{x+3}}{L_x}$	$\frac{L_{x+5}}{L_x}$	$\frac{L_{x+10}}{L_x}$
50–51	76, 328	.987	.959	.927	.832
51–52	75, 341	.986	.956	.922	.821
52–53	74, 292	.985	.953	.917	.808
53–54	73, 181	.984	.949	.911	.795
54–55	72, 010	.983	.946	.905	.780
55–56	70, 776	.982	.942	.898	.765
56–57	69, 478	.980	.938	.890	.749
57–58	68, 114	.979	.933	.881	.731
58–59	66, 674	.977	.927	.872	.713
59–60	65, 149	.975	.922	.863	.693
60–61	63, 536	.973	.915	.852	.672
61–62	61, 834	.971	.909	.841	.650
62–63	60, 042	.969	.902	.829	.627
63–64	58, 163	.966	.894	.817	.603
64–65	56, 200	.964	.886	803	.577
65–66	54, 155	961	.877	.788	.550
66–67	52, 023	.957	.868	773	.522
67–68	49, 805	954	.857	.756	.493
68–69	47, 506	.950	.846	738	.463
69–70	45, 133	.946	834	.719	.433
70–71	42, 693	.941	.821	.698	.402
71–72	40, 193	.936	.807	676	.370
72–73	37, 641	.931	.792	653	.339
73–74	35, 050	.925	.775	.628	.309
74–75	32, 430	.919	.757	.602	.279
75–76	29, 797	.912	.739	.575	.250
76–77	27, 167	904	.719	.548	.222
77–78	24, 563	896	698	.520	.196
78–79	22, 007	.887	677	492	.171
79–80	19, 526	878	654	463	.148
80–81	17, 145	.868	631	435	.127
81–82	14, 889	.858	608	.406	.108
82–83	12, 777	.847	583	377	.091
83–84	10, 825	.836	.558	348	.076
84–85	9, 047	.823	.532	320	.063
85–86	7, 450	.810	.506	293	.051
86–87	6, 038	.797	479	267	.041
87–88	4, 812	.783	.453	.242	.033
88–89	3, 767	.768	.428	.218	.025
89–90	2, 895	.754	.402	196	.019
90–91	2, 182	.739	.377	175	.015
91–92	1, 612	.723	.352	.154	.018
92–93	1, 165	.706	.327	.135	.005
93–94	823	.689	.301	.117	.001
94–95	567	.672	277	099	.004
95–96	381	.651	.252	.084	.003
96–97	248	.633	.226	069	------------
97–98	157	.611	.204	.057	------------
98–99	96	.583	.177	.042	------------
99–100	56	.571	.161	.036	------------
100–101	32	.531	.125	.031	------------
101–102	17	.529	.118	------------	------------
102–103	9	.444	.111	------------	------------
103–104	4	.500	------------	------------	------------
104–105	2	.500	------------	------------	------------
105–106	1	------------	------------	------------	------------

TABLE 5.—*Decimal fractions based upon 1940 physician data showing (a) physicians gainfully employed in single years of age, (b) service capacity of gainfully employed physicians based upon relative number of patients seen weekly by gainfully employed general practitioners, and (c) service capacity of all physicians expressed as the product of decimals showing fraction gainfully employed and their service capacity*

Year of age (1)	Fraction of all physicians in year of age who were gainfully employed (2)	Fraction service capacity of gainfully employed physicians in year of age (3)	Fraction service capacity of all physicians in year of age (4)	Year of age (1)	Fraction of all physicians in year of age who were gainfully employed (2)	Fraction service capacity of gainfully employed physicians in year of age (3)	Fraction service capacity of all physicians in year of age (4)
x to $x+1$	r'_x	r''_x	$r''_x r'_x$	x to $x+1$	r'_x	r''_x	$r''_x r'_x$
25-26	1.00	0.10	0.10	65-66	.90	.47	.42
26-27	1.00	.24	.24	66-67	.89	.45	.40
27-28	1.00	.37	.37	67-68	.88	.42	.37
28-29	1.00	.48	.48	68-69	.87	.40	.35
29-30	1.00	.59	.59	69-70	.85	.38	.32
30-31	1.00	.68	.68	70-71	.84	.35	.29
31-32	1.00	.76	.76	71-72	[illegible]	.33	.27
32-33	1.00	.83	.83	72-73	.81	.31	.25
33-34	1.00	.88	.88	73-74	.80	.29	.23
34-35	.99	.92	.91	74-75	.77	.27	.21
35-36	.99	.95	.94	75-76	.75	.25	.19
36-37	.99	.97	.96	76-77	.73	.23	.17
37-38	.99	.99	.98	77-78	.70	.21	.15
38-39	.99	1.00	.99	78-79	.68	.19	.13
39-40	.99	1.00	.99	79-80	.66	.17	.11
40-41	.99	1.00	.99	80-81	.63	.15	.09
41-42	.99	.99	.98	81-82	.60	.14	.08
42-43	.98	.98	.96	82-83	.57	.12	.07
43-44	.98	.97	.95	83-84	.53	.11	.06
44-45	.98	.95	.93	84-85	.51	.08	.04
45-46	.98	.93	.91	85-86	.47	.08	.04
46-47	.98	.91	.89	86-87	.44	.07	.03
47-48	.98	.89	.87	87-88	.41	.06	.02
48-49	.97	.87	.84	88-89	.37	.05	.02
49-50	.97	.84	.81	89-90	.33	.04	.01
50-51	.97	.81	.79	90-91	.31	.03	.01
51-52	.97	.79	.77	91-92	.28	.02	.01
52-53	.97	.77	.75	92-93	.25	.02	.01
53-54	.96	.75	.72	93-94	.22	.02	----------
54-55	.96	.72	.69	94-95	.18	.01	----------
55-56	.95	.70	.66	95-96	.15	.01	----------
56-57	.95	.68	.65	96-97	.12	.01	----------
57-58	.95	.66	.63	97-98	.09	.01	----------
58-59	.94	.63	.59	98-99	.05	.01	----------
59-60	.94	.61	.57	99-100	.02	----------	----------
60-61	.94	.59	.55				
61-62	.93	.56	.52				
62-63	.92	.54	.50				
63-64	.91	.52	.47				
64-65	.90	.50	.45				

TABLE 6.—*Stationary population for white males based upon 1930–39 mortality and corresponding gainfully employed and service capacity stationary populations developed for use in projecting future totals from base-year counts of physicians*

Year of age	Stationary population for white males		Gainfully employed stationary population		Service capacity of stationary population	
	In year of age	In year of age and all later years	In year of age	In year of age and all later years	In year of age	In year of age and all later years
(1)	(2)	(3)	(4)	(5)	(6)	(7)
x to $x+1$	L_x	T_x	r'_xL_x or L'_x	T'_x	$r'_xr''_xL_x$ or L''_x	T''_x
25–26	88, 795	3, 772, 644	88, 795	3, 548, 300	8, 880	2, 461, 803
26–27	88, 522	3, 683, 849	88, 522	3, 459, 505	21, 245	2, 452, 923
27–28	88, 246	3, 595, 327	88, 246	3, 370, 983	32, 651	2, 431, 678
28–29	87, 964	3, 507, 081	87, 964	3, 282, 737	42, 223	2, 399, 027
29–30	87, 674	3, 419, 117	87, 674	3, 194, 773	51, 728	2, 356, 804
30–31	87, 374	3, 331, 443	87, 374	3, 107, 099	59, 414	2, 305, 076
31–32	87, 063	3, 244, 069	87, 063	3, 019, 725	66, 168	2, 245, 662
32–33	86, 740	3, 157, 006	86, 740	2, 932, 662	71, 994	2, 179, 494
33–34	86, 401	3, 070, 266	86, 401	2, 845, 922	76, 033	2, 107, 500
34–35	86, 041	2, 983, 865	85, 181	2, 759, 521	78, 367	2, 031, 467
35–36	85, 661	2, 897, 824	84, 804	2, 674, 340	80, 564	1, 953, 100
36–37	85, 258	2, 812, 163	84, 405	2, 589, 536	81, 873	1, 872, 536
37–38	84, 832	2, 726, 905	83, 984	2, 505, 131	83, 144	1, 790, 663
38–39	84, 384	2, 642, 073	83, 540	2, 421, 147	83, 540	1, 707, 519
39–40	83, 912	2, 557, 689	83, 073	2, 337, 607	83, 073	1, 623, 979
40–41	83, 415	2, 473, 777	82, 581	2, 254, 534	82, 581	1, 540, 906
41–42	82, 890	2, 390, 362	82, 061	2, 171, 953	81, 240	1, 458, 325
42–43	82, 334	2, 307, 472	80, 687	2, 089, 892	79, 073	1, 377, 085
43–44	81, 742	2, 225, 138	80, 107	2, 009, 205	77, 704	1, 298, 012
44–45	81, 111	2, 143, 396	79, 489	1, 929, 098	7[illegible], 515	1, 220, 308
45–46	80, 435	2, 062, 285	78, 826	1, 849, 609	73, 308	1, 144, 793
46–47	79, 715	1, 981, 850	78, 121	1, 770, 783	71, 090	1, 071, 485
47–48	78, 947	1, 902, 135	77, 368	1, 692, 662	68, 858	1, 000, 395
48–49	78, 128	1, 823, 188	75, 784	1, 615, 294	65, 932	931, 537
49–50	77, 256	1, 745, 060	74, 938	1, 539, 510	62, 948	865, 605
50–51	76, 328	1, 667, 804	74, 038	1, 464, 572	59, 971	802, 657
51–52	75, 341	1, 591, 476	73, 081	1, 390, 534	57, 734	742, 686
52–53	74, 292	1, 516, 135	72, 063	1, 317, 453	55, 489	684, 952
53–54	73, 181	1, 441, 843	70, 254	1, 245, 390	52, 691	629, 463
54–55	72, 010	1, 368, 662	69, 130	1, 175, 136	49, 774	576, 772
55–56	70, 776	1, 296, 652	67, 237	1, 106, 006	47, 066	526, 998
56–57	69, 478	1, 225, 876	66, 004	1, 038, 769	44, 883	479, 932
57–58	68, 114	1, 156, 398	64, 708	972, 765	42, 707	435, 049
58–59	66, 674	1, 088, 284	62, 674	908, 057	39, 485	392, 342
59–60	65, 149	1, 021, 610	61, 240	845, 383	37, 356	352, 857
60–61	63, 536	956, 461	59, 724	784, 143	35, 237	315, 501
61–62	61, 834	892, 925	57, 506	724, 419	32, 203	280, 264
62–63	60, 042	831, 091	55, 239	666, 913	29, 829	248, 061
63–64	58, 163	771, 049	52, 928	611, 674	27, 523	218, 232
64–65	56, 200	712, 886	50, 580	558, 746	25, 290	190, 709
65–66	54, 155	656, 686	48, 740	508, 166	22, 908	165, 419
66–67	52, 023	602, 531	46, 300	459, 426	20, 835	142, 511
67–68	49, 805	550, 508	43, 828	413, 126	18, 408	121, 676
68–69	47, 506	500, 703	41, 330	369, 298	16, 532	103, 268
69–70	45, 133	453, 197	38, 363	327, 968	14, 578	86, 736
70–71	42, 693	408, 064	35, 862	289, 605	12, 552	72, 158
71–72	40, 193	365, 371	83, 360	253, 743	11, 009	59, 606
72–73	37, 641	325, 178	80, 489	220, 383	9, 452	48, 597
73–74	35, 050	287, 537	28, 040	189, 894	8, 132	39, 145
74–75	32, 430	252, 487	24, 971	161, 854	6, 742	31, 013.

TABLE 6.—*Stationary population for white males based upon 1930–39 mortality and corresponding gainfully employed and service capacity stationary populations developed for use in projecting future totals from base-year counts of physicians*—Continued

Year of age	Stationary population for white males		Gainfully employed stationary population		Service capacity of stationary population	
	In year of age	In year of age and all later years	In year of age	In year of age and all later years	In year of age	In year of age and all later years
(1)	(2)	(3)	(4)	(5)	(6)	(7)
x to $x+1$	L_x	T_x	$r'_x L_x$ or L'_x	T'_x	$r'_x r''_x L_x$ or L''_x	T''_x
75–76	29,797	220,057	22,348	136,883	5,587	24,271
76–77	27,167	190,260	19,832	114,535	4,561	18,684
77–78	24,563	163,093	17,194	94,703	3,611	14,123
78–79	22,007	138,530	14,965	77,509	2,843	10,512
79–80	19,526	116,523	12,857	62,544	2,191	7,669
80–81	17,145	96,997	10,801	49,657	1,620	5,478
81–82	14,889	79,852	8,933	38,856	1,251	3,858
82–83	12,777	64,963	7,283	29,929	874	2,607
83–84	10,825	52,186	5,737	22,640	631	1,733
84–85	9,047	41,361	4,614	16,903	369	1,102
85–86	7,450	32,314	3,502	12,289	280	733
86–87	6,038	24,864	2,657	8,787	186	453
87–88	4,812	18,826	1,973	6,130	118	267
88–89	3,767	14,014	1,394	4,157	70	149
89–90	2,895	10,247	955	2,763	38	79
90–91	2,182	7,352	676	1,808	20	41
91–92	1,612	5,170	451	1,132	9	21
92–93	1,165	3,558	291	681	6	12
93–94	823	2,393	181	390	4	6
94–95	567	1,570	102	209	1	2
95–96	381	1,003	57	107	1	1
96–97	248	622	30	50		
97–98	157	374	14	20		
98–99	96	217	5	6		
99–100	56	121	1	1		
100–101	32	65				
101–102	17	33				
102–103	9	16				
103–104	4	7				
104–105	2	3				
105–106	1	1				

Table 7.—*Total and average expectancy for years of life, years of gainful employment, and years of service capacity developed from 1930–39 stationary population for white males for use in estimating over-all resources for future years from base-year counts of physicians*

Year of age	Future years remaining at middle of year of age for individuals in stationary population							
	Years of life		Years of gainful employment			Years of service capacity		
				Average			Average	
	Total all individuals	Average all individuals	Total all individuals	All individuals	Gainfully employed individuals	Total all individuals	All individuals	Gainfully employed individuals
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
x to $x+1$	$T_x-\frac{1}{2}L_x$	$\frac{T_x-\frac{1}{2}L_x}{L_x}$	$T'_x-\frac{1}{2}L'_x$	$\frac{T'_x-\frac{1}{2}L'_x}{L_x}$	$\frac{T'_x-\frac{1}{2}L'_x}{L'_x}$	$T''_x-\frac{1}{2}L''_x$	$\frac{T''_x-\frac{1}{2}L''_x}{L_x}$	$\frac{T''_x-\frac{1}{2}L''_x}{L'_x}$
25–26	3,728,246	42.0	3,503,902	39.4	39.4	2,457,363	27.7	27.7
26–27	3,639,588	41.1	3,415,244	38.6	38.6	2,442,300	27.6	27.6
27–28	3,551,204	40.2	3,326,800	37.7	37.7	2,415,352	27.4	27.4
28–29	3,463,099	39.4	3,238,755	36.8	36.8	2,377,915	27.0	27.0
29–30	3,375,280	38.5	3,150,936	35.9	35.9	2,330,940	26.6	26.6
30–31	3,287,756	37.6	3,063,412	35.1	35.1	2,275,869	26.0	26.0
31–32	3,200,537	36.8	2,976,193	34.2	34.2	2,212,578	25.4	25.4
32–33	3,113,636	35.9	2,889,292	33.3	33.3	2,143,497	24.7	24.7
33–34	3,027,065	35.0	2,802,721	32.4	32.4	2,069,483	24.0	24.0
34–35	2,940,844	34.2	2,716,930	31.6	31.9	1,992,283	23.2	23.4
35–36	2,851,993	33.3	2,631,938	30.7	31.0	1,912,818	22.3	22.6
36–37	2,769,534	32.5	2,547,333	29.9	30.2	1,831,599	21.5	21.7
37–38	2,684,489	31.6	2,463,139	29.0	20.3	1,749,091	20.6	20.8
38–39	2,599,881	30.8	2,379,377	28.2	28.5	1,665,749	19.7	19.9
39–40	2,515,733	30.0	2,296,070	27.4	27.6	1,582,412	18.9	19.0
40–41	2,432,069	29.2	2,213,243	26.5	26.8	1,499,615	18.0	18.2
41–42	2,348,917	28.3	2,130,922	25.7	26.0	1,417,705	17.1	17.3
42–43	2,266,305	27.5	2,049,548	24.9	25.4	1,337,548	16.2	16.6
43–44	2,184,267	26.7	1,969,151	24.1	24.6	1,259,160	15.4	15.7
44–45	2,102,840	25.9	1,889,353	23.3	23.8	1,182,550	14.6	14.9
45–46	2,022,067	25.1	1,810,196	22.5	23.0	1,108,139	13.8	14.1
46–47	1,941,992	24.4	1,731,722	21.7	22.2	1,035,940	13.0	13.3
47–48	1,862,661	23.6	1,653,978	21.0	21.4	965,966	12.2	12.5
48–49	1,784,124	22.8	1,577,825	20.2	20.8	898,571	11.5	11.9
49–50	1,706,432	22.1	1,502,041	19.4	20.0	834,131	10.8	11.1
50–51	1,629,640	21.4	1,427,553	18.7	19.3	772,671	10.1	10.4
51–52	1,553,805	20.6	1,353,993	18.0	18.5	713,819	9.5	9.8
52–53	1,478,989	19.9	1,281,421	17.2	17.8	657,207	8.8	9.1
53–54	1,405,252	19.2	1,210,263	16.5	17.2	603,117	8.2	8.6
54–55	1,332,657	18.5	1,140,571	15.8	16.5	551,885	7.7	8.0
55–56	1,261,264	17.8	1,072,387	15.2	15.9	503,465	7.1	7.5
56–57	1,191,137	17.1	1,005,767	14.5	15.2	457,490	6.6	6.9
57–58	1,122,341	16.5	940,411	13.8	14.5	413,695	6.1	6.4
58–59	1,054,947	15.8	876,720	13.1	14.0	372,599	5.6	5.9
59–60	989,035	15.2	814,763	12.5	13.3	334,179	5.1	5.5
60–61	924,693	14.6	754,281	11.9	12.6	297,882	4.7	5.0
61–62	862,008	13.9	695,666	11.2	12.1	264,162	4.3	4.6
62–63	801,070	13.3	639,293	10.6	11.6	233,146	3.9	4.2
63–64	741,967	12.8	585,210	10.1	11.1	204,470	3.5	3.9
64–65	684,786	12.2	533,456	9.5	10.5	178,064	3.2	3.5
65–66	629,608	11.6	483,796	8.9	9.9	153,965	2.8	3.2
66–67	576,519	11.1	436,276	8.4	9.4	132,093	2.5	2.8
67–68	525,605	10.6	391,212	7.9	8.9	112,472	2.3	2.6
68–69	476,950	10.0	348,633	7.3	8.4	95,002	2.0	2.3
69–70	430,630	9.5	308,786	6.8	8.0	79,447	1.8	2.1
70–71	386,717	9.0	271,674	6.4	7.6	65,882	1.5	1.8
71–72	345,274	8.6	237,068	5.9	7.1	54,101	1.3	1.6
72–73	306,357	8.1	206,863	5.5	6.7	43,871	1.2	1.4
73–74	270,012	7.7	175,874	5.0	6.3	35,079	1.0	1.2
74–75	236,272	7.3	149,868	4.6	6.0	27,642	.9	1.1

TABLE 7.—*Total and average expectancy for years of life, years of gainful employment, and years of service capacity developed from 1930–39 stationary population for white males for use in estimating over-all resources for future years from base-year counts of physicians*—Continued

Year of age	Future years remaining at middle of year of age for individuals in stationary population							
	Years of life		Years of gainful employment			Years of service capacity		
	Total all individuals	Average all individuals	Total all individuals	Average: All individuals	Average: Gainfully employed individuals	Total all individuals	Average: All individuals	Average: Gainfully employed individuals
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
x to $x+1$	$T_x-\frac{1}{2}L_x$	$\frac{T_x-\frac{1}{2}L_x}{L_x}$	$T'_x-\frac{1}{2}L'_x$	$\frac{T'_x-\frac{1}{2}L'_x}{L_x}$	$\frac{T'_x-\frac{1}{2}L'_x}{L'_x}$	$T''_x-\frac{1}{2}L''_x$	$\frac{T''_x-\frac{1}{2}L''_x}{L_x}$	$\frac{T''_x-\frac{1}{2}L''_x}{L'_x}$
75–76	205,158	6.9	125,709	4.2	5.6	21,477	.7	1.0
76–77	176,676	6.5	104,619	3.8	5.3	16,403	.6	.8
77–78	150,811	6.1	86,106	3.5	5.0	12,317	5	.7
78–79	127,526	5.8	70,026	3.2	4.7	9,090	4	.6
79–80	106,760	5.5	56,100	2.9	4.4	6,573	.3	5
80–81	88,424	5.2	44,256	2.6	4.1	4,668	.3	.4
81–82	72,407	4.9	34,389	2.3	3.8	3,232	.2	4
82–83	58,574	4.6	26,281	2.1	3.6	2,170	2	.3
83–84	46,773	4.3	19,771	1.8	3.4	1,417	1	.2
84–85	36,837	4.1	14,596	1.6	3.2	917	1	.2
85–86	28,589	3.8	10,538	1.4	3.0	593	.1	2
86–87	21,845	3.6	7,458	1.2	2.8	360	.1	.1
87–88	16,420	3.4	5,143	1.1	2.6	208	-----	.1
88–89	12,130	3.2	3,460	.9	2.5	114	-----	.1
89–90	8,799	3.0	2,285	.8	2.4	60	-----	.1
90–91	6,261	2.9	1,470	.7	2.2	31	-----	-----
91–92	4,364	2.7	906	.6	2.0	16	-----	-----
92–93	2,975	2.6	535	5	1.8	9	-----	-----
93–94	1,981	2.4	299	4	1.7	4	-----	-----
94–95	1,286	2.3	158	.3	1.5	1	-----	-----
95–96	812	2.1	78	.2	1.4	-----	-----	-----
96–97	498	2.0	35	.1	1.2	-----	-----	-----
97–98	295	1.9	13	.1	.9	-----	-----	-----
98–99	169	1.8	3	-----	.6	-----	-----	-----
99–100	93	1.7	-----	-----	-----	-----	-----	-----
100–101	49	1.5	-----	-----	-----	-----	-----	-----
101–102	24	1.4	-----	-----	-----	-----	-----	-----
102–103	11	1.2	-----	-----	-----	-----	-----	-----
103–104	5	1.2	-----	-----	-----	-----	-----	-----
104–105	2	1.0	-----	-----	-----	-----	-----	-----
105–106	1	1.0	-----	-----	-----	-----	-----	-----

Appendix B—Formulas

SECTION 1.—GENERAL FORMULAS [1]

FORMULA 1.—Fraction of physicians in a designated year of age who may be expected to survive over some specified number of years.

$$\frac{L_{x+d}}{L_x}$$

Let: x = lower limit of year of age
$x+1$ = upper limit of year of age
d = number of years in the specified survival period
L_x = stationary population in the designated year of age x to $x+1$
L_{x+d} = stationary population in the year of age $x+d$ to $x+1+d$

[1] Values for L_x, L'_x, L''_x may be obtained from table 6.

FORMULA 2.—Fraction of physicians in a designated broad age interval who may be expected to survive over some specified number of years.

$$\frac{L_{X+d}}{L_X}$$

Let: L_X = stationary population in the designated broad age interval (obtained by summating stationary population for the years of age within the broad interval)

d = number of years in the specified survival period

L_{X+d} = stationary population surviving d years hence from those in the broad age interval (obtained by summating stationary population for the years of age d years older than those entering in the L_X summation)

FORMULA 3.—Number of physicians in a designated year of age who may be expected to survive over some specified number of years.

$$S_{x+d} = P_x \left\{ \frac{L_{x+d}}{L_x} \right\}$$

Let: **S_{x+d} = survivors from an enumerated physician total in the year of age x to $x+1$ over a specified number of years d**

P_x = enumerated physician total for the designated year of age x to $x+1$

$\frac{L_{x+d}}{L_x}$ = see formula 1

FORMULA 4.—Number of physicians in a designated broad age interval who may be expected to survive over some specified number of years.

$$S_{X+d} = P_X \left\{ \frac{L_{X+d}}{L_X} \right\}$$

Let: **S_{X+d} = survivors from the enumerated physician total in the broad age interval X over a specified number of years d**

P_X = enumerated physician total in the broad age interval X

$\frac{L_{X+d}}{L_X}$ = see formula 2

FORMULA 5.—Estimated number of gainfully employed physicians in an unqualified total for a designated broad age interval.

$$E_X = P_X \left\{ \frac{L'_X}{L_X} \right\}$$

Let: **E_X = estimated gainfully employed physicians in the designated broad age interval X**

P_X = enumerated physician total in the designated broad age interval X

L_X = stationary population in the broad age interval X

L'_X = gainfully employed stationary population in the broad age interval X

FORMULA 6.—Estimated number of service equivalents in an unqualified total for a designated broad age interval.

$$C_X = P_X \left\{ \frac{L''_X}{L_X} \right\}$$

Let: **C_X = estimated service equivalents in the designated broad age interval X**

P_X = enumerated physician total in the designated broad age interval X

L_X = stationary population in the broad age interval X

L''_X = service-equivalent stationary population in the broad age interval X

FORMULA 7.—Estimated service equivalents of gainfully employed physicians in a designated broad age interval.

$$CE_X = GE_X \left\{ L''_X \right.$$

Let: CE_X=estimated service equivalents of gainfully employed physicians in the designated age group X
GE_X=enumerated total gainfully employed physicians in the designated broad age interval X
L'_X=gainfully employed stationary population in the broad age interval X
L''_X=service-equivalent stationary population in the broad age interval X

SECTION 2.—SPECIAL FORMULAS FOR ESTIMATING AVERAGE FUTURE YEARS OF EXPECTANCY

In table 6 future years of employment, T'_x, and future years of service capacity, T''_x, have been accumulated from L'_x and L''_x, respectively. These columns may be used for the determination of average future expectancies, as is the T_x column of the standard life table.

The value T_x (table 6) corresponds to the estimate of future years of life for individuals in the year of age x to $x + 1$ as of the beginning of the age interval. When it is assumed that individuals are equally spaced in time and expectancies are desired for the average individual in an age group, the T_x total is adjusted to take into account the fact that as of a given time some individuals in the age interval have only just reached that age whereas others have nearly reached their next birthday. On the average, individuals in the age interval x to $x+1$ have already lived one-half of the time over which they may be classified in the interval. Therefore, the future years of life remaining to individuals in the age interval x to $x+1$ actually correspond to the usual T_x diminished by one-half of the years they might live in the interval x to $x+1$, or $T_x - \frac{1}{2} L_x$ (table 7). As T'_x, T''_x, L'_x, and L''_x are derived from the same base as is T_x, like adjustments are made in these values. Therefore, total future years of gainful employment for the group L'_x is $T'_x - \frac{1}{2} L'_x$, while total future years of service capacity is $T''_x - \frac{1}{2} L''_x$.

From these values L_x, L'_x, L''_x, $T_x - \frac{1}{2} L_x$, $T'_x - \frac{1}{2} L'_x$ and $T''_x - \frac{1}{2} L''_x$ average future expectancies which have special bearing upon the problem of estimating physician resources can be computed from the following formulas.

FORMULA 8.—Average estimated future years of life per physician in a designated broad age interval.

$$\frac{T_X - \frac{1}{2}L_X}{L_X}$$

Let: T_X=sum of the T_x values for years of age included in the designated broad age interval X
L_X=sum of the L_x values for years of age included in the broad age interval X.

FORMULA 9.—Average estimated future years of gainful employment per physician in a designated broad age interval.

$$\frac{T'_X - \frac{1}{2}L'_X}{L_X}$$

Let: T'_X=sum of the T'_x values for years of age included in the designated broad age interval X
L'_X=sum of the L'_x values for years of age included in the broad age interval X
L_X=sum of the L_x values for years of age included in the broad age interval X.

FORMULA 10.—Average estimated future years of gainful employment per gainfully employed physician in a designated broad age interval.

$$\frac{T'_X - \frac{1}{2}L'_X}{L'_X}$$

Let: T'_X=sum of the T'_x values for years of age included in the designated broad age interval X
L'_X=sum of the L'_x values for years of age included in the broad age interval X.

FORMULA 11.—Average estimated future service-year equivalents per physician in a designated broad age interval.

$$\frac{T''_X-\frac{1}{2}L''_X}{L_X}$$

Let: T''_X=sum of the T''_x values for years of age included in the designated broad age interval X

L''_X=sum of the L''_x values for years of age included in the broad age interval X

L_X=sum of the L_x values for years of age included in the broad age interval X.

FORMULA 12.—Average estimated service-year equivalents per gainfully employed physician in a designated broad age interval.

$$\frac{T''_X-\frac{1}{2}L''_X}{L'_X}$$

Let: T''_X=sum of the T''_x values for years of age included in the designated broad age interval X

L''_X=sum of the L''_x values for years of age included in the broad age interval X

L'_X=sum of the L'_x values for years of age included in the designated broad age interval X.

DEATHS DURING WEEK ENDED FEBRUARY 19, 1944

[From the Weekly Mortality Index, issued by the Bureau of the Census, Department of Commerce]

	Week ended Feb. 19, 1944	Corresponding week, 1943
Data for 89 large cities of the United States		
Total deaths	9,698	10,331
Average for 3 prior years	9,633	
Total deaths, first 7 weeks of year	73,512	71,316
Deaths under 1 year of age	628	679
Average for 3 prior years	597	
Deaths under 1 year of age, first 7 weeks of year	4,375	5,037
Data from industrial insurance companies		
Policies in force	66,306,324	65,363,449
Number of death claims	14,178	13,574
Death claims per 1,000 policies in force, annual rate	11.2	10.8
Death claims per 1,000 policies, first 7 weeks of year, annual rate	12.1	10.7

PREVALENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED FEBRUARY 26, 1944

Summary

The incidence of meningococcus meningitis continues high and increased slightly during the week. A total of 552 cases was reported currently as compared with 529 for the preceding week, 484 for the corresponding week last year, and a 5-year (1939–43) median of 51 cases. Slight increases were recorded for 5 geographic areas, decreases in 3, while the East North Central area reported the same number of cases each week. A total of 4,488 cases has been reported to date this year, as compared with 2,959 for the corresponding period last year.

Of the other common communicable diseases listed in the weekly table following, the incidence of only measles and scarlet fever is above that both for last week and the median expectancy. The cumulative figure for measles is higher than for any prior year since 1938, while the number of cases of scarlet fever reported to date exceeds that for any prior year since 1939. The incidence of both influenza and poliomyelitis is below the median expectancy. To date, new low records have been established for both diphtheria and whooping cough, the number of cases of the latter disease reported to date being less than half the figures for last year and the 5-year median.

More cases of typhoid fever have been reported to date this year than for the same period for any prior year since 1939, largely accounted for by recent outbreaks in Indiana and Kentucky. Of 65 cases reported for the current week, as compared with 91 for the preceding week, 12 cases occurred in Indiana, 8 in Ohio, and 7 in Texas.

Mortality in large cities for the current week is below both the figure for last week and the 3-year (1941–43) average. A total of 9,591 deaths was reported in 90 large cities, as compared with 9,744 last week and a 3-year average of 9,617. The deaths in these cities to date this year total 83,358, as compared with 81,891 for the same period last year.

Telegraphic morbidity reports from State health officers for the week ended Feb. 26, 1944, and comparison with corresponding week of 1943 and 5-year median

In these tables a zero indicates a definite report, while leaders imply that, although none was reported, cases may have occurred.

Division and State	Diphtheria			Influenza			Measles			Meningitis, meningococcus		
	Week ended—		Median 1939–43	Week ended—		Median 1939–43	Week ended—		Median 1939–43	Week ended—		Median 1939–43
	Feb. 26, 1944	Feb. 27, 1943		Feb. 26, 1944	Feb. 27, 1943		Feb. 26, 1944	Feb. 27, 1943		Feb. 26, 1944	Feb. 27, 1943	
NEW ENGLAND												
Maine	1	0	0	3	1	9	182	8	138	1	17	0
New Hampshire	0	0	0		----	----	22	51	15	1	0	0
Vermont	0	0	0	8	----	----	195	349	5	2	1	0
Massachusetts	10	1	2	----	----	----	453	743	411	9	13	4
Rhode Island	0	0	0	----	1	-	333	34	34	3	17	1
Connecticut	0	1	1	----	1	3	360	437	238	6	4	0
MIDDLE ATLANTIC												
New York	13	22	25	[1] 5	[1] 10	[1] 44	2,338	1,596	1,596	58	43	5
New Jersey	2	1	8	19	10	42	1,436	1,109	208	17	35	2
Pennsylvania	10	16	16	16	5		2,410	3,398	1,027	37	30	5
EAST NORTH CENTRAL												
Ohio	5	7	16	24	10	24	2,103	217	177	30	6	1
Indiana	6	3	13	10	40	40	298	421	87	6	5	0
Illinois	20	13	19	36	31	54	1,213	553	376	26	12	2
Michigan [2]	5	4	4	14	-		1,581	285	285	24	12	0
Wisconsin	2	1	1	134	49	183	1,690	834	662	11	6	0
WEST NORTH CENTRAL												
Minnesota	5	5	4	2		7	1,381	42	291	10	0	0
Iowa	4	2	4	48	2	42	342	276	195	4	1	0
Missouri	8	7	8		3	4	382	423	78	25	27	1
North Dakota	1	0	1	4	20	23	241	67	42	1	0	0
South Dakota	4	4	2		1	1	85	107	7	1	0	0
Nebraska	4	5	3	22	39	---	48	247	82	2	1	9
Kansas	2	5	5	8	6	45	513	320	320	5	5	2
SOUTH ATLANTIC												
Delaware	1	0	1	----	1	----	17	25	2	3	1	0
Maryland [2]	3	4	2	18	4	103	870	38	77	11	15	2
District of Columbia	0	0	1	2	2	8	121	94	44	4	2	2
Virginia	6	10	15	746	803	1,604	872	436	223	29	46	4
West Virginia	7	2	6	68	15	42	295	17	49	4	3	3
North Carolina	3	11	10	67	50	64	1,339	56	343	19	13	0
South Carolina	4	6	4	800	986	986	366	44	44	10	9	1
Georgia	4	6	5	122	106	147	381	65	232	7	3	1
Florida	2	10	5	13	4	13	209	20	138	9	12	0
EAST SOUTH CENTRAL												
Kentucky	6	7	7	214	11	115	142	865	55	13	9	2
Tennessee	2	4	6	151	57	83	624	316	133	30	11	3
Alabama	9	11	11	205	389	620	512	60	172	14	21	3
Mississippi [2]	0	9	9	----	----	----	----	----	----	10	23	1
WEST SOUTH CENTRAL												
Arkansas	6	5	7	223	102	286	139	122	107	6	4	1
Louisiana	3	7	6	163	12	12	258	99	83	9	4	1
Oklahoma	4	6	6	209	155	193	105	57	57	10	5	1
Texas	33	34	36	2,142	1,606	1,667	1,192	697	577	27	16	1
MOUNTAIN												
Montana	0	2	2	25	----	11	208	129	125	2	1	0
Idaho	0	4	1	----	----	----	30	88	74	0	1	0
Wyoming	0	0	1	9	85	52	65	147	67	1	0	0
Colorado	3	12	8	112	53	61	403	445	147	3	3	1
New Mexico	4	0	0	11	5	5	51	28	28	1	2	0
Arizona	4	1	3	189	147	156	224	14	21	2	3	1
Utah [2]	0	0	0	316	103	43	48	384	155	0	3	0
Nevada	0	0	0	----	----	----	0	6	0	0	5	0
PACIFIC												
Washington	3	3	3	4	----	3	150	999	271	7	11	1
Oregon	2	1	2	64	80	37	94	505	235	6	6	0
California	15	42	23	199	91	126	752	481	481	36	36	3
Total	226	294	294	6,425	5,096	8,987	27,073	17,754	16,918	552	503	51
8 weeks	2,031	2,480	2,639	301,265	36,354	39,064	141,035	96,436	96,436	4,488	2,959	437

See footnotes at end of table.

Telegraphic morbidity reports from State health officers for the week ended Feb. 26, 1944, and comparison with corresponding week of 1943 and 5-year median—Con.

Division and State	Poliomyelitis			Scarlet fever			Smallpox			Typhoid and paratyphoid fever [3]		
	Week ended— Feb. 26, 1944	Week ended— Feb. 27, 1943	Median 1939–43	Week ended— Feb. 26, 1944	Week ended— Feb. 27, 1943	Median 1939–43	Week ended— Feb. 26, 1944	Week ended— Feb. 27, 1943	Median 1939–43	Week ended— Feb. 26, 1944	Week ended— Feb. 27, 1943	Median 1939–43
NEW ENGLAND												
Maine	0	0	0	27	14	13	0	0	0	0	0	0
New Hampshire	0	0	0	28	13	4	0	0	0	1	0	0
Vermont	0	0	0	27	12	12	0	0	0	1	0	0
Massachusetts	0	0	0	415	531	233	0	0	0	0	1	1
Rhode Island	0	0	0	13	18	18	0	0	0	0	0	0
Connecticut	0	0	0	79	80	80	0	0	0	1	0	1
MIDDLE ATLANTIC												
New York	1	0	1	589	645	645	0	0	0	4	5	5
New Jersey	1	1	1	193	134	187	0	0	0	0	1	1
Pennsylvania	0	0	1	610	277	408	0	0	0	3	3	4
EAST NORTH CENTRAL												
Ohio	0	1	1	396	275	275	0	0	0	8	8	3
Indiana	0	1	1	164	110	186	8	1	1	12	0	0
Illinois	0	0	1	360	261	432	1	3	3	1	4	3
Michigan [2]	1	1	1	262	124	241	1	0	0	3	1	1
Wisconsin	0	0	1	371	291	174	0	1	4	0	1	0
WEST NORTH CENTRAL												
Minnesota	0	1	0	181	68	106	0	0	2	0	0	0
Iowa	0	0	0	128	103	102	0	1	9	0	0	1
Missouri	0	0	0	201	133	97	0	0	2	1	1	1
North Dakota	0	0	0	48	11	27	0	0	0	0	0	0
South Dakota	0	0	0	37	9	22	0	2	1	0	0	0
Nebraska	0	0	0	82	47	47	0	0	0	0	0	0
Kansas	0	0	0	124	73	82	0	3	3	0	1	1
SOUTH ATLANTIC												
Delaware	0	0	0	6	7	13	0	0	0	0	0	0
Maryland [3]	0	0	0	180	102	62	0	0	0	0	0	0
District of Columbia	0	0	0	227	35	20	0	0	0	0	0	0
Virginia	0	2	2	102	44	41	0	0	0	2	1	1
West Virginia	0	1	1	70	47	47	0	0	0	3	2	2
North Carolina	0	0	1	39	25	44	0	0	0	0	0	0
South Carolina	0	0	0	6	5	5	1	0	0	8	2	2
Georgia	0	0	0	11	26	20	0	0	0	1	5	2
Florida	2	0	1	19	29	5	0	0	0	0	0	1
EAST SOUTH CENTRAL												
Kentucky	0	0	0	82	45	74	0	1	1	0	0	8
Tennessee	0	0	0	179	85	85	0	0	0	2	5	3
Alabama	1	0	0	18	18	23	0	0	1	1	1	1
Mississippi [3]	0	0	1	11	12	10	0	0	0	4	2	1
WEST SOUTH CENTRAL												
Arkansas	0	0	1	9	6	6	4	0	2	0	1	1
Louisiana	1	0	0	7	12	12	1	0	0	1	5	5
Oklahoma	3	0	0	32	28	28	0	0	1	0	2	2
Texas	2	1	1	87	66	58	3	0	1	7	0	2
MOUNTAIN												
Montana	0	0	1	34	22	33	0	0	0	0	0	0
Idaho	0	0	0	30	2	9	0	0	0	2	0	0
Wyoming	0	0	0	11	102	13	0	0	0	0	0	0
Colorado	0	0	0	63	106	42	0	0	1	0	0	0
New Mexico	0	2	0	10	7	7	0	1	1	0	3	0
Arizona	0	0	0	17	12	9	0	0	0	0	1	0
Utah [3]	1	1	1	139	66	37	0	0	0	0	0	0
Nevada	0	0	0	0	2	0	0	0	0	0	0	0
PACIFIC												
Washington	5	0	0	247	62	53	3	0	0	0	0	0
Oregon	1	0	0	120	12	18	0	0	0	1	1	1
California	5	3	2	333	153	153	3	0	0	3	1	2
Total	24	15	25	6,424	4,367	4,367	25	13	36	65	53	65
8 weeks	209	228	228	40,428	30,415	30,415	113	229	375	651	409	617

See footnotes at end of table.

Telegraphic morbidity reports from State health officers for the week ended Feb. 26, 1944, and comparison with corresponding week of 1943 and 5-year median—Con.

Division and State	Whooping cough: Week ended— Feb. 26, 1944	Whooping cough: Week ended— Feb. 27, 1943	Whooping cough: Median 1939–43	Week ended Feb. 26, 1944: Anthrax	Dysentery: Amebic	Dysentery: Bacillary	Dysentery: Unspecified	Encephalitis, infectious	Leprosy	Rocky Mt. spotted fever	Tularemia	Typhus fever
NEW ENGLAND												
Maine	12	58	37	0	0	0	0	0	0	0	0	0
New Hampshire	5	5	1	0	0	0	0	0	0	0	0	0
Vermont	23	7	19	0	0	0	0	0	0	0	0	0
Massachusetts	49	138	138	1	0	1	0	0	0	0	0	0
Rhode Island	4	31	31	0	0	0	0	0	0	0	0	0
Connecticut	7	62	60	0	0	0	0	0	0	0	0	0
MIDDLE ATLANTIC												
New York	116	310	354	0	0	14	0	0	0	0	0	0
New Jersey	50	176	176	0	0	0	0	0	0	0	0	0
Pennsylvania	204	352	352	0	1	1	0	0	0	0	0	0
EAST NORTH CENTRAL												
Ohio	93	203	203	0	0	0	0	0	0	0	0	0
Indiana	25	61	26	0	2	0	0	0	0	0	0	0
Illinois	54	131	131	0	0	0	0	1	0	0	0	0
Michigan [2]	112	228	225	0	1	5	0	0	0	0	0	0
Wisconsin	103	223	199	0	0	0	0	0	0	0	0	0
WEST NORTH CENTRAL												
Minnesota	34	67	40	0	2	2	0	0	0	0	0	0
Iowa	14	19	19	0	0	0	0	0	0	0	0	0
Missouri	28	16	26	0	0	0	0	1	0	0	0	0
North Dakota	4	13	13	0	0	0	1	0	0	0	0	0
South Dakota	3	0	0	0	0	0	0	0	0	0	0	0
Nebraska	85	14	12	0	0	0	0	0	0	0	0	0
Kansas	21	43	39	0	0	2	0	0	0	0	0	0
SOUTH ATLANTIC												
Delaware	0	15	5	0	0	0	0	0	0	0	0	0
Maryland [2]	23	110	82	0	0	0	0	0	0	0	0	0
District of Columbia	2	26	24	0	0	0	0	0	0	0	0	0
Virginia	55	130	65	0	0	0	87	1	0	1	0	0
West Virginia	45	39	27	0	0	0	0	0	0	0	0	0
North Carolina	123	155	155	0	0	0	0	0	0	0	0	1
South Carolina	47	40	158	0	0	1	0	0	0	0	0	0
Georgia	26	32	23	0	0	2	0	0	0	0	0	5
Florida	24	23	14	0	0	1	0	0	0	0	0	5
EAST SOUTH CENTRAL												
Kentucky	57	34	47	0	0	1	0	0	0	0	0	0
Tennessee	40	62	55	0	0	0	1	0	0	0	0	1
Alabama	33	77	34	0	0	0	0	0	0	0	0	5
Mississippi [2]	------	------	------	0	0	0	0	0	0	0	0	1
WEST SOUTH CENTRAL												
Arkansas	3	29	10	0	0	2	0	0	0	0	0	0
Louisiana	0	4	4	0	2	2	0	0	0	0	0	0
Oklahoma	6	15	13	0	0	0	0	0	0	0	0	0
Texas	124	472	111	0	29	155	0	4	0	0	0	12
MOUNTAIN												
Montana	17	36	15	0	0	0	0	0	0	0	0	0
Idaho	0	0	5	0	0	0	0	0	0	0	0	0
Wyoming	2	2	4	0	0	0	0	2	0	0	0	0
Colorado	30	18	40	0	0	2	0	0	0	0	0	0
New Mexico	5	15	20	0	0	0	1	0	0	0	0	0
Arizona	29	15	36	0	0	0	17	0	0	0	0	0
Utah [2]	9	25	25	0	0	0	0	0	0	0	0	0
Nevada	0	1	0	0	0	0	0	0	0	0	0	0
PACIFIC												
Washington	22	24	37	0	1	0	0	0	0	0	0	0
Oregon	36	15	15	0	0	0	0	0	0	0	0	0
California	62	332	247	0	1	4	0	0	0	0	0	0
Total	1,816	3,898	3,898	1	39	195	107	9	0	1	0	30
8 weeks	14,465	30,944	32,255	7	182	1,733	488	72	5	2	80	354
8 weeks, 1943	------	------	------	11	149	1,542	296	74	4	1	146	436

[1] New York City only. [2] Period ended earlier than Saturday.
[3] Including paratyphoid fever cases reported separately as follows: Illinois, 1; South Carolina, 1, Texas, 1.

WEEKLY REPORTS FROM CITIES

City reports for week ended February 12, 1944

This table lists the reports from 88 cities of more than 10,000 population distributed throughout the United States, and represents a cross section of the current urban incidence of the diseases included in the table.

	Diphtheria cases	Encephalitis, infectious, cases	Influenza Cases	Influenza Deaths	Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
NEW ENGLAND												
Maine:												
Portland	0	0		0	4	0	1	0	8	0	0	0
New Hampshire:												
Concord	0	0		0	1	1	0	0	0	0	0	0
Vermont:												
Barre	0	0		0	0	0	0	0	1	0	0	0
Massachusetts:												
Boston	6	0		0	38	5	13	0	93	0	0	23
Fall River	1	0		0	3	0	3	0	3	0	0	4
Springfield	0	0		0	60	0	1	0	13	0	0	5
Worcester	0	0	1	1	3	2	10	0	70	0	0	3
Rhode Island:												
Providence	0	0	1	1	227	1	8	0	13	0	0	3
Connecticut:												
Bridgeport	0	0	1	1	8	1	2	0	1	0	0	1
Hartford	0	0	2	0	0	0	1	0	4	0	0	0
New Haven	0	0		0	33	0	2	0	6	0	0	3
MIDDLE ATLANTIC												
New York:												
Buffalo	0	0		2	3	1	4	0	10	0	0	2
New York	9	3	14	0	1,110	41	71	0	415	0	1	35
Rochester	0	0		0	0	4	0	0	2	0	0	1
Syracuse	0	0		2	0	1	1	0	7	0	0	7
New Jersey:												
Camden	0	0	1	1	0	1	1	0	22	0	0	0
Newark	0	0	13	1	41	4	2	0	13	0	0	14
Trenton	0	0	2	0	5	2	4	0	12	0	0	2
Pennsylvania:												
Philadelphia	0	0	12	7	21	9	39	0	67	0	0	6
Pittsburgh	1	0	5	4	308	4	18	0	21	0	0	6
Reading	0	0		1	8	0	2	0	3	0	0	1
EAST NORTH CENTRAL												
Ohio:												
Cincinnati	3	0	3	1	10	5	4	0	30	0	0	1
Cleveland	0	0	6	1	655	10	13	0	67	0	1	31
Columbus	0	0	1	1	85	0	2	0	7	0	0	8
Indiana:												
Fort Wayne	0	0		0	47	0	1	0	2	0	4	0
Indianapolis	7	0		3	14	3	8	0	53	0	0	8
South Bend	0	0		0	9	0	0	0	4	0	0	3
Terre Haute	0	0		1	0	0	5	0	0	0	0	0
Illinois:												
Chicago	3	0	4	0	21	28	37	0	145	0	1	26
Springfield	0	0		0	89	1	5	0	5	0	0	0
Michigan:												
Detroit	3	0	2	2	70	13	19	0	71	0	0	8
Flint	0	0		0	16	0	3	0	2	0	0	0
Grand Rapids	0	0		0	184	2	1	0	14	0	0	0
Wisconsin:												
Kenosha	0	0		0	1	0	0	0	12	0	0	6
Milwaukee	0	0	1	1	22	2	8	0	85	0	0	26
Racine	1	0		0	8	0	0	0	2	0	0	9
Superior	0	0		0	22	1	4	0	14	0	0	0
WEST NORTH CENTRAL												
Minnesota:												
Duluth	0	0		0	20	0	3	0	13	0	0	9
Minneapolis	3	0		0	462	3	4	0	42	0	0	0
St. Paul	0	0		0	352	1	7	0	45	0	0	6
Missouri:												
Kansas City	2	0		3	7	3	9	0	19	0	0	1
St. Joseph	0	0		0	1	1	0	0	1	0	0	1
St. Louis	0	0	3	1	83	10	9	0	22	0	1	3

City reports for week ended February 12, 1944—Continued

	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
WEST NORTH CENTRAL—Continued												
North Dakota:												
Fargo	0	0	----	0	34	1	0	0	13	0	0	0
Nebraska:												
Omaha	1	0	----	0	2	0	4	0	21	0	0	0
Kansas:												
Topeka	0	0	----	0	5	1	0	0	2	0	0	3
Wichita	0	0	----	0	160	5	0	0	2	0	0	7
SOUTH ATLANTIC												
Delaware:												
Wilmington	0	0	----	0	10	0	4	0	0	0	0	0
Maryland:												
Baltimore	0	0	4	2	384	3	20	0	50	0	0	25
Cumberland	0	0	----	0	0	0	0	0	2	0	0	0
Frederick	0	0	----	0	0	0	0	0	1	0	0	0
District of Columbia:												
Washington	0	0	3	0	72	2	15	1	231	0	0	6
Virginia:												
Lynchburg	0	0	21	0	2	0	3	0	4	0	0	0
Richmond	1	0	1	1	143	0	6	0	7	0	0	0
Roanoke	0	0	----	0	73	0	0	0	0	0	0	0
West Virginia:												
Charleston	0	0	----	0	4	0	0	0	5	0	0	0
Wheeling	0	0	4	0	2	0	0	0	6	0	0	2
North Carolina:												
Winston-Salem	0	0	----	0	73	0	2	0	1	0	0	1
South Carolina:												
Charleston	0	0	46	0	29	5	5	0	1	0	0	0
Georgia:												
Atlanta	0	0	52	1	28	0	4	0	7	0	0	1
Brunswick	0	0	----	0	49	0	0	0	0	0	0	0
Savannah	0	0	5	3	8	1	1	0	1	0	0	0
Florida:												
Tampa	0	0	1	0	15	0	3	0	4	0	0	0
EAST SOUTH CENTRAL												
Tennessee:												
Memphis	1	0	49	6	8	9	6	0	14	0	0	10
Nashville	0	0	----	2	8	7	6	0	5	0	0	0
Alabama:												
Birmingham	0	0	62	2	60	0	3	0	3	0	0	0
Mobile	0	0	13	0	5	3	2	0	1	0	0	0
WEST SOUTH CENTRAL												
Arkansas:												
Little Rock	0	0	7	0	60	1	2	0	0	0	0	2
Louisiana:												
New Orleans	5	0	32	5	27	10	9	1	4	0	2	0
Shreveport	0	0	----	0	0	0	6	0	0	0	0	0
Texas:												
Dallas	1	0	1	1	29	1	4	0	4	0	0	1
Galveston	1	0	----	0	4	0	0	0	1	0	0	0
Houston	3	0	----	0	21	1	13	0	1	0	0	0
San Antonio	2	0	3	3	9	3	8	0	2	0	0	1
MOUNTAIN												
Montana:												
Billings	0	0	----	0	4	0	0	0	0	0	0	1
Great Falls	0	0	11	0	8	0	0	0	6	0	0	0
Helena	0	0	----	0	1	0	1	0	0	0	0	0
Missoula	0	0	----	0	1	0	2	0	5	0	0	0
Idaho:												
Boise	0	0	----	0	1	0	0	0	3	0	0	0
Colorado:												
Denver	1	0	5	0	84	0	9	0	22	0	1	13
Pueblo	0	0	----	0	61	0	2	0	2	0	0	6
Utah:												
Salt Lake City	0	0	----	1	8	0	4	0	32	0	0	5

City reports for week ended February 12, 1944—Continued

	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
PACIFIC												
Washington:												
Seattle	0	0	------	0	9	0	6	0	42	0	0	2
Spokane	0	0	2	2	30	1	5	0	18	0	0	0
Tacoma	0	0	------	1	8	1	1	0	64	0	0	5
California:												
Los Angeles	5	0	39	4	124	4	9	2	43	0	0	5
Sacramento	0	0	1	1	6	0	2	0	2	0	0	0
San Francisco	0	0	9	2	47	9	6	0	60	0	0	6
Total	60	3	443	72	5,762	228	498	4	2,131	0	11	364
Corresponding week, 1943	55	2	255	50	3,542	118	525	4	1,409	0	5	1,000
Average, 1939-43	87	------	2,028	[1] 80	[2] 3,618	------	[1] 577	------	1,380	14	15	1,063

Dysentery, bacillary.—Cases: Rochester, 1; Chicago, 2; Charleston, S. C., 6, Memphis, 2, Los Angeles, 3.
Typhus fever.—Cases: Savannah, 2; Memphis, 1; Nashville, 1; Birmingham, 1; New Orleans, 1; Houston, 1, San Antonio, 1.

[1] 3-year average, 1941-43.
[2] 5-year median.

Rates (annual basis) per 100,000 population, by geographic groups, for the 88 cities in the preceding table (estimated population, 1942, 34,680,400)

	Diphtheria case rates	Encephalitis, infectious, case rates	Influenza		Measles case rates	Meningitis, meningococcus, case rates	Pneumonia death rates	Poliomyelitis case rates	Scarlet fever case rates	Smallpox case rates	Typhoid and paratyphoid fever case rates	Whooping cough case rates
			Case rates	Death rates								
New England	17.4	0.0	12.5	7.5	939	24.9	102.1	0.0	528	0.0	0.0	105
Middle Atlantic	4.5	1.3	21.0	8.0	667	30.0	63.5	0.0	256	0.0	0.4	33
East North Central	10.0	0.0	10.0	5.9	734	38.1	64.4	0.0	300	0.0	3.5	74
West North Central	11.8	0.0	5.9	7.8	2,207	49.0	70.5	0.0	353	0.0	2.0	59
South Atlantic	1.7	0.0	238.4	12.2	1,552	19.1	109.6	1.7	557	0.0	0.0	61
East South Central	6.0	0.0	738.5	59.6	482	113.2	101.2	0.0	137	0.0	0.0	60
West South Central	35.3	0.0	126.5	26.5	441	47.1	123.5	2.9	35	0.0	5.9	12
Mountain	8.1	0.0	129.0	8.1	1,354	0.0	145.1	0.0	564	0.0	8.1	202
Pacific	8.3	0.0	89.4	17.5	393	26.3	50.8	3.5	401	0.0	0.0	82
Total	9.0	0.5	66.8	10.9	869	34.4	75.1	0.6	321	0.0	1.7	55

TERRITORIES AND POSSESSIONS

Hawaii Territory

Honolulu—Dengue fever.—During the first 2 weeks of January 1944, 28 cases of dengue fever were reported in Honolulu, T. H., while for the last 2 weeks of January, 11 cases were reported, bringing the total number of reported cases of dengue fever in Honolulu to 1,379 up to January 31, 1944.

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—Week ended January 29, 1944.—During the week ended January 29, 1944, cases of certain communicable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox		16		468	381	72	26	141	183	1,287
Diphtheria		16	13	63	3	5	5			105
Dysentery (bacillary)				6						6
Encephalitis, infectious				1						1
German measles		2		28	20	3	6	11	11	81
Influenza	1	147	6		926	8	1		296	1,385
Measles	1	37	1	1,135	313	41	81	243	20	1,872
Meningitis, meningococcus		4		8	6		1		1	20
Mumps		22		170	217	49	7	48	90	603
Scarlet fever		18		148	229	73	30	61	80	639
Tuberculosis (all forms)		3	7	228	41	10	2	19	46	356
Typhoid and paratyphoid fever				22						22
Undulant fever				1					1	2
Whooping cough		30		260	161	6	20	13	46	536

CUBA

Habana—Communicable diseases—4 weeks ended February 5, 1944.—During the 4 weeks ended February 5, 1944, certain communicable diseases were reported in Habana, Cuba, as follows:

Disease	Cases	Deaths	Disease	Cases	Deaths
Diphtheria	27		Poliomyelitis	1	
Leprosy	1		Scarlet fever	1	
Malaria	2		Tuberculosis	6	3
Measles	21		Typhoid fever	49	1
Paratyphoid fever	1				

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

NOTE.—Except in cases of unusual prevalence, only those places are included which had not previously reported any of the above-mentioned diseases, except yellow fever, during the current year. All reports of yellow fever are published currently.

A cumulative table showing the reported prevalence of these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.

(Few reports are available from the invaded countries of Europe and other nations in war zones.)

Plague

Egypt—Suez.—During the week ended January 29, 1944, 22 cases of plague with 8 deaths were reported in Suez, Egypt.

Smallpox

British East Africa—Kenya.—Smallpox has been reported in Kenya, British East Africa, as follows: week ended January 22, 1944, 202 cases; week ended January 29, 1944, 229 cases. The highest incidence has occurred in Central, Nyanza, and Rift Valley Provinces.

Egypt—Port Said.—During the week ended January 29, 1944, 46 cases of smallpox with 1 death were reported in Port Said, Egypt.

India.—Smallpox has been reported in India as follows: Bombay—week ended January 22, 1944, 180 cases, 50 deaths as compared with 112 cases and 26 deaths during the preceding week. Calcutta—weeks ended January 1, 1944, 75 deaths, January 8, 109 deaths, January 15, 116 deaths, January 22, 133 deaths.

Mexico—Torreon.—During the week ended February 12, 1944, 14 cases of smallpox were reported in Torreon, Mexico.

Niger Territory.—During the period January 1–10, 1944, 170 cases of smallpox with 8 deaths were reported in Niger Territory.

Sudan (French).—During the period January 1–10, 1944, 109 cases of smallpox with 3 deaths were reported in French Sudan.

Turkey.—During the period November 16 to December 15, 1943, 1,152 cases of smallpox were reported in Turkey.

Typhus Fever

Hungary.—For the two weeks ended February 5, 1944, 107 cases of typhus fever were reported in Hungary.

Rumania.—During the period February 1–7, 1944, 525 cases of typhus fever were reported in Rumania.

Slovakia.—For the 3 weeks ended January 29, 1944, 70 cases of typhus fever were reported in Slovakia.

Spain.—Typhus fever has been reported in Spain as follows: week ended December 18, 1943, 14 cases, week ended December 25, 4 cases.

Turkey.—During the month of December 1943, 123 cases of typhus fever were reported in Turkey, including 7 cases reported in Istanbul.

COURT DECISION ON PUBLIC HEALTH

Milk regulations—validity.—(West Virginia Supreme Court of Appeals; *State* v. *Bunner et al.*, 27 S.E.2d 823; decided November 23, 1943.) The milk regulations of the public health council of West Virginia, among other things, made it unlawful for any person not possessing a permit from the health officer to sell any milk and provided that only a person who complied with the requirements of the regulations was entitled to receive and retain a permit. The defendants were charged with having sold a pint of milk from their store without having a permit from the health officer. A county criminal court sustained the defendants' demurrer to the indictment and the State, after being refused a writ of error by the circuit court of the county, appealed to the Supreme Court of Appeals of West Virginia.

One of the objections raised by the defendants was that the State statute under which the regulations were adopted was unconstitutional because it attempted to vest in the public health council an unwarranted power to legislate by prescribing public health regulations. By the statutes the council was required to promulgate regulations and was authorized to establish and amend regulations under the public health laws. A violation of the regulations so promulgated, when the regulations were reasonable and not inconsistent with law, was a misdemeanor. It was also provided in the statutes that the council "shall adopt regulations to provide clean and safe milk and fresh milk products." The appellate court took the view that standards and limitations with respect to the regulations or "legislation" which the council was empowered to adopt were contained in the statutes. Such standards were found by the court in those provisions which required regulations to be reasonable and consistent with law and which mentioned clean and safe milk. The defendants' contention that the statute was invalid because it improperly delegated legislative power was rejected by the court.

With respect to the regulations the defendants argued that the requirement of a permit was void because the legislative act did not expressly confer upon the public health council power to require a permit. The court pointed out that a permit requirement was a very simple, effective, and mild method of control and that in the instant case no fee was charged and no difficulty or delay was involved. "When issued, a permit can be nothing more than a formal certification by the health officer that the milk proposed to be sold by a named vendor has been produced under conditions prescribed by the health council." The court was of the opinion that the regulation in that respect was valid.

The defendants also took the position that the regulation conferred upon the health officer arbitrary power to grant or refuse a permit

because it did not state upon what conditions an applicant was entitled to a permit and did not in terms require the granting of a permit to all who were duly qualified. However, the appellate court did not so construe the regulation. It was expressly provided that only a person who complied with the requirements was entitled to a permit, and, according to the court, this clearly stipulated that one who had not complied should not receive a permit and equally stated that one who had complied should be so entitled. It was immaterial that the regulation did not prescribe any exact method of making application. It did provide that the permit should be from the health officer, thus designating the person to whom application should be made.

The statutes provided that every general regulation adopted by the public health council "shall state the day on which it takes effect" and the defendants urged the invalidity of the regulations because they failed to show on their face the time when they should go into effect. The only provision in the regulations purporting to show their effective date was one which stated that "this regulation shall be in full force and effect immediately upon its adoption and its publication, as provided by law." The State argued that, although no date in words and figures was mentioned, the allusion in the regulations to the date of adoption was a sufficient reference to the health council's minutes, a public record, where the exact day could be found, and that this sufficiently complied with the statutory requirement. "Possibly," said the court, "this would be true if the date of adoption alone fixed the time when the regulations should become effective; but the regulations do not so say. The provision is that the regulations shall be in effect, not simply upon their adoption but upon their adoption and publication as provided by law. The crucial date, therefore, is not that of the adoption but that of the completion of the publication of the regulations and there is no attempt therein to state when the publication shall be complete. Hence, there is a complete failure to comply with this statutory requirement." According to the court the statutory provision was clearly mandatory.

Further, the indictment was held defective because it failed to allege that the regulations came into effect on or before the date of their alleged violation by the defendants. While the indictment did allege the adoption of the regulations on November 6, 1939, the only reference to their publication was that they were duly published by distribution and circulation in the manner determined by the council. The indictment thus failed to show when the regulations were published.

The judgments of the county criminal and circuit courts in favor of the defendants were affirmed.

FEDERAL SECURITY AGENCY

UNITED STATES PUBLIC HEALTH SERVICE

THOMAS PARRAN, *Surgeon General*

DIVISION OF PUBLIC HEALTH METHODS

G. ST. J. PERROTT, *Chief of Division*

THE PUBLIC HEALTH REPORTS, first published in 1878 under authority of an act of Congress of April 29 of that year, is issued weekly by the United States Public Health Service through the Division of Public Health Methods, pursuant to the following authority of law: United States Code, title 42, sections, 7, 30, 93; title 44, section 220.

It contains (1) current information regarding the prevalence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

The PUBLIC HEALTH REPORTS is published primarily for distribution, in accordance with the law, to health officers, members of boards or departments of health, and other persons directly or indirectly engaged in public health work. Articles of special interest are issued as reprints or as supplements, in which forms they are made available for more economical and general distribution.

Requests for and communications regarding the PUBLIC HEALTH REPORTS, reprints, or supplements should be addressed to the Surgeon General, United States Public Health Service, Washington, D. C. Subscribers should remit direct to the Superintendent of Documents, Washington, D. C.

Librarians and others should preserve their copies for binding, as the Public Health Service is unable to supply the general demand for bound copies. Indexes will be supplied upon request.

UNITED STATES GOVERNMENT PRINTING OFFICE, WASHINGTON . 1944

For sale by the Superintendent of Documents, Washington 25, D. C.

Price 5 cents. Subscription price $2.50 a year

Public Health Reports

VOLUME 59 MARCH 10, 1944 NUMBER 10

IN THIS ISSUE

The Reportable Diseases

CONTENTS

Public Health Reports

Vol. 59 • MARCH 10, 1944 • *No. 10*

THE REPORTABLE DISEASES

DISEASES AND CONDITIONS REQUIRED TO BE REPORTED IN THE SEVERAL STATES

By WILLIAM FOWLER, *United States Public Health Service*

The laws and regulations of the State health departments of all of the States and of Alaska, the District of Columbia, Hawaii, and Puerto Rico have been examined to ascertain the diseases and conditions which are required to be reported, with special reference to communicable and occupational diseases. The data are presented in two ways. The diseases are first listed alphabetically, and under each disease appear the names of the States in which it is reportable. Following this there is given under each State information showing the diseases which are reportable in that State. In this latter part the names of the diseases are given as they appear in the laws and regulations. In the first part, however, for brevity and uniformity it was necessary in listing the diseases alphabetically to use one term to describe a disease which might be variously designated in the different State statutes and regulations. Therefore, to indicate what is included in a particular disease title there have been listed under such title, immediately preceding the names of the States, the various other terms which are used in the State laws and regulations. As an example, reference may be made to the disease title "Conjunctivitis (acute infectious)." Preceding the names of the States in which this disease is reportable there will be found the various terms used in the statutes and regulations to designate this condition. If, however, a State describes a disease by the same term as is here used and then follows such term by another which is merely synonymous, the use of such synonymous term has not been indicated. When information is desired regarding the terminology used in a particular State, reference should be made as stated above to that portion of the analysis showing the diseases reportable in each State.

The codes and latest available session laws for each jurisdiction have been searched, and the following shows the latest legislative sessions through which the laws have been checked:

1942. Kentucky (regular and special), Louisiana (regular and special), Massachusetts (special), Mississippi (regular), Virginia (regular).

1943 (regular). Alabama, Alaska, Arizona, Arkansas, California,[1] Colorado, Connecticut, Delaware, District of Columbia, Florida, Georgia, Hawaii, Idaho, Illinois, Indiana, Iowa, Kansas, Maine, Maryland, Michigan, Minnesota, Missouri, Montana, Nebraska, Nevada, New Hampshire, New Jersey (to October 1943), New Mexico, New York, North Carolina, North Dakota, Ohio, Oklahoma, Oregon, Pennsylvania (to April 21, 1943), Puerto Rico, Rhode Island, South Carolina, South Dakota, Tennessee, Texas, Utah, Vermont, Washington, West Virginia, Wisconsin (to Sept. 1, 1943), Wyoming.

The citations to pertinent statutes will be found in that portion of the analysis showing the data by States. In a few instances the text of the State health department regulations with reference to the reportability of some disease or diseases has not been available, and reliance has been placed on information received from the State health authorities. It should be pointed out, of course, that the persons who must report, the conditions under which reports must be made, etc., vary in different jurisdictions, and to secure information regarding these and related matters recourse should be had to the statutes and regulations themselves.

OCCUPATIONAL DISEASES

Occupational diseases are reportable in 24 States.[2] The diseases and conditions which are reportable vary in the different jurisdictions. In 9 States (Colorado, Georgia, Iowa, Kansas, Kentucky, Louisiana, New Mexico, South Carolina, Washington) reports are required under State health department regulations, in 10 States (Alabama, Connecticut, Maine, Minnesota, Montana, New Hampshire, New Jersey, New York, Rhode Island, Wisconsin) reports are made pursuant to statute, and in 5 States (Maryland, Michigan, Missouri, Ohio, Pennsylvania) there are both State health department regulations and statutory provisions requiring reports.

In those States having statutes on the subject such laws provide for reports to be made to the health authorities in 12 States (Alabama, Connecticut, Maine, Maryland, Michigan, Minnesota, Missouri, Montana, New Hampshire, Ohio, Rhode Island, Wisconsin), to the labor authorities in 2 States (Maine—certain cases of compressed air illness, New York) and, in certain cases of lead poisoning, to both the health and labor authorities in 3 States (New Jersey, Ohio,

[1] 1943 first and second special sessions also checked.

[2] Alabama, Colorado, Connecticut, Georgia, Iowa, Kansas, Kentucky, Louisiana, Maine, Maryland, Michigan, Minnesota, Missouri, Montana, New Hampshire, New Jersey, New Mexico, New York, Ohio, Pennsylvania, Rhode Island, South Carolina, Washington, Wisconsin.

Pennsylvania). While Minnesota has been listed above as requiring reports to the health authorities pursuant to a 1939 law (sec. 144.34 of the 1941 Statutes), mention should be made of a 1913 law which is still carried in the 1941 Statutes as section 175.33 and which provides for reporting to the industrial commission. However, the later law covers the same and more diseases than the earlier law; and because of this, only the later law was considered in the analysis above.

The Missouri statute declares especially dangerous to the health of employees "The carrying on of any process, or manufacture, or labor * * * in which antimony, arsenic, brass, copper, lead, mercury, phosphorus, zinc, their alloys or salts, or any poisonous chemicals, minerals, acids, fumes, vapors, gases, or other substances are generated or used, employed, or handled by the employees in harmful quantities, or under harmful conditions, or come in contact with in a harmful way." Every employer engaged in carrying on any such process or manufacture is required, as often as once each month, to have all employees who come into direct contact with the poisonous agencies or injurious processes examined by a physician to ascertain the existence of any industrial or occupational disease or illness. The examining physician must make a report of the physical examination, and if any such disease or illness is found shall so report.

The statutes of New Jersey and Pennsylvania and one of the pertinent statutes of Ohio have particular reference to lead poisoning and declare certain work especially dangerous to the health of employees who, while engaged therein, are exposed to lead dusts, fumes, or solutions. At least monthly examinations of such employees by a physician are required, and a report must be made by the physician when he finds what he believes to be symptoms of lead poisoning.

A Massachusetts law provides that the State department of labor and industries may require every physician treating a patient whom he believes to be suffering from any ailment or disease contracted as a result of the nature, circumstances, or conditions of the patient's employment to report such information relating thereto as it may require. The department may issue a list of such diseases which shall be regularly reported upon by physicians and may add to or change such list at any time.

Communicable diseases and certain other conditions

Actinomycosis:

Ala.	Fla.	Iowa	Mich.	Nev.	S. C.	Wash.
Ariz.	Ga.	Kans.	Minn.	N. Mex.	S. Dak.	W. Va.
Colo.	Hawaii	Ky.	Mo.[1]	N. Dak.	Tenn.	Wyo.
Conn.	Idaho	Maine	Mont.	Ohio	Utah	
Del.	Ill.	Mass.	Nebr.[1]	R. I.	Vt.	

[1] Actinomycosis in animals is also reportable.

Amebiasis. (*See* Dysentery (amebic).)

Ancylostomiasis. (*See* Hookworm disease.)

Anthrax:
(Malignant anthrax.)

Ala.	D. C.	Iowa	Mich.	N. J.	Oreg.	Tex.[1]
Ariz.	Fla.	Kans.	Minn.	N. Mex.	Pa.	Utah
Ark.	Ga.	Ky.	Mo.[1]	N. Y.	P. R.	Vt.
Calif.	Hawaii	La.	Mont.	N. C.	R. I.	Wash.
Colo.[1]	Idaho	Maine	Nebr.	N. Dak.	S. C.	W. Va.
Conn.	Ill.	Md.	Nev.	Ohio	S. Dak.	Wyo.
Del.	Ind.	Mass.	N. H.	Okla.	Tenn.	

[1] Anthrax in animals is also reportable.

Ascariasis:

Ga.	Iowa	N. Dak.	Ohio	Oreg.	Wash.	Wyo.
Idaho						

Asiatic cholera. (*See* Cholera.)

Avitaminosis. (*See also* Beriberi; pellagra; scurvy.)

Wash.

Bang's disease. (*See* Undulant fever.)

Beriberi: (*See also* Avitaminosis.)

Fla.	Mo.	N. Mex.

Bites. (*See* Dog and other animal bites; dog bite.)

Blastomycosis. (*See* Coccidioidomycosis.)

Botulism: (*See also* Food infections and poisonings)

Ariz.	D. C.	Ill.	Maine	Mo.	N. H.	Oreg.
Calif.	Fla.	Ind.	Md.	Mont.	N. Y.	R. I.
Colo.	Ga.	Iowa	Mich.	Nebr.	N. Dak.	Tenn.
Conn.	Idaho	La.	Minn.	Nev.	Ohio	Wyo.

Bronchitis:

Nev.

Cancer:
(Cancer or other malignant tumor; carcinoma; leukemia; lymphoma; sarcoma; malignant growths (other than those specified).)

Ala.	Fla.	La.	Mont.	N. H.	N. Y.	R. I.
Ark.	Kans.	Miss.	Nev.	N. Mex.	Pa.	Wis.
Del.						

Cerebrospinal meningitis. (*See* Meningococcus meningitis.)

Chancroid: (*See also* Venereal diseases.)

Ala.	Del.	Kans.	Mo.	N. Y.	P. R.	Utah
Alaska	D. C.	Ky.	Mont.	N. C.	R. I.	Va.
Ariz.	Fla.	La.	Nebr.	N. Dak.	S. C.	Wash.
Ark.	Ga.	Maine	Nev.	Ohio	S. Dak.	W. Va.
Calif.	Idaho	Md.	N. H.	Okla.	Tenn.	Wis.
Colo.	Ill.	Mich.	N. J.	Oreg.	Tex.	Wyo.
Conn.	Ind.	Minn.	N. Mex.			

Chickenpox:
(Varicella.)

Ala.	D. C.	Kans.	Minn.	N. J.	Oreg.	Utah
Alaska	Fla.	Ky.	Miss.	N. Mex.	Pa.	Vt.
Ariz.	Ga.	La.	Mo.	N. Y.	P. R	Va.
Ark.	Hawaii	Maine	Mont.	N. C.	S. C.	Wash.
Calif.	Idaho	Md.	Nebr.	N. Dak.	S. Dak.	W. Va.
Colo.	Ill.	Mass.	Nev.	Ohio	Tenn.	Wis.
Conn.	Ind.	Mich.	N. H.	Okla.	Tex.	Wyo.
Del.	Iowa					

Cholecystitis of typhoid origin:

Mass.

Cholera:
(Asiatic cholera.)

Ala.	D. C.	Iowa	Mich.	N. J.	Oreg.	Tex.
Alaska	Fla.	Kans.	Minn.	N. Mex.	Pa.	Utah
Ariz.	Ga.	Ky.	Miss.	N. Y.	P. R.	Vt.
Ark.	Hawaii	La.	Mo.	N. C.	R. I.	Wash.
Calif.	Idaho	Maine	Mont.	N. Dak.	S. C.	W. Va.
Colo.	Ill.	Md.	Nebr.	Ohio	S. Dak.	Wis.
Conn.	Ind.	Mass.	N. H.	Okla.	Tenn.	Wyo.
Del.						

Cholera nostras. (*See* Gastroenteritis.)

Coccidioidomycosis:
(Coccidioidal granuloma; blastomycosis.)

Ariz.	Fla.	Idaho	Ky.	Nev.	Ohio	Wash.
Calif.	Ga.	Iowa	Mich.	N. Dak.	Oreg.	Wyo.

Cold. (*See* Common cold.)

Colorado tick fever:

Colo.

Common cold:

Ga.	Iowa	Ohio

Communicable diseases:
(Communicable diseases (other than those specified) during an epidemic; any contagious disease; outbreak of any rare or unusual disease of importance to public; other epidemics.)

Alaska	Md.	S. C.	Va.

Conjunctivitis (acute infectious):
(Ophthalmia neonatorum; acute infectious conjunctivitis of the newborn; gonorrheal ophthalmia; infectious conjunctivitis; acute suppurative conjunctivitis; pink eye; follicular conjunctivitis; conjunctivitis; ophthalmia; acute epidemic conjunctivitis; epidemic conjunctivitis; ophthalmia in persons over 14 days of age (all infectious types); gonorrhea (ophthalmia), suppurative conjunctivitis; ophthalmia neonatorum (gonorrheal); inflammation of eyes of newborn.)

Ala.	Fla.	Ky.	Miss.	N. Mex.	Pa.	Utah
Ariz.	Ga.	La.	Mo.	N. Y.	P. R.	Vt.
Ark.	Hawaii	Maine	Mont.	N. C.	R. I.	Va.
Calif.	Idaho	Md.	Nebr.	N. Dak.	S. C.	Wash.
Colo.	Ill.	Mass.	Nev.	Ohio	S. Dak.	W. Va.
Conn.	Ind.	Mich.	N. H.	Okla.	Tenn.	Wis.
Del.	Iowa	Minn.	N. J.	Oreg.	Tex.	Wyo.
D. C.	Kans.					

Continued fever lasting 7 days:

Kans.	N. Mex.

Defect. (*See* Physical defect.)

Dengue:

Ala.	Del.	Ill.	Maine	Nev.	Oreg.	Utah
Ariz.	Fla.	Iowa	Mich.	N. Mex.	P. R.	Wash.
Ark.	Ga.	Kans.	Minn.	N. Dak.	S. C.	W. Va.
Calif.	Hawaii	Ky.	Miss.	Ohio	Tenn.	Wyo.
Colo.	Idaho	La.	Mo.	Okla.	Tex.	

Diabetes:

Pa.

Diarrhea:
(Enterocolitis.)

Va.	Wash.

Diarrhea (infantile):
(Epidemic diarrhea of the newborn; diarrhea in infants under 3 weeks; diarrhea in children under 1 year (in institutions); diarrhea and enteritis (under 2 years); diarrhea of newborn under 1 month; diarrhea in children; infectious diarrhea of the newborn; diarrhea of the newborn (in institutions).)

Calif.	Fla.	Kans.	Nev.	N. Dak.	Ohio	Wyo.
D. C.	Ill.	Mich.	N. J.			

Diphtheria:
(Diphtheria (all forms); membranous croup)

Ala.	D. C.	Kans.	Miss.	N. Mex.	Pa.	Utah
Alaska	Fla.	Ky.	Mo.	N. Y.	P. R.	Vt.
Ariz.	Ga.	La.	Mont.	N. C.	R. I.	Va.
Ark.	Hawaii	Maine	Nebr.	N. Dak.	S. C.	Wash.
Calif.	Idaho	Md.	Nev.	Ohio	S. Dak.	W. Va.
Colo.	Ill.	Mass.	N. H.	Okla.	Tenn.	Wis.
Conn.	Ind.	Mich.	N. J.	Oreg.	Tex.	Wyo.
Del.	Iowa	Minn.				

Dog and other animal bites:
(Bite by a dog, cat, or other animal; bites by animals having or suspected of having rabies; bites by animals of a species subject to rabies; bite by dog or animal having, or suspected of having, rabies; person or animal bitten by dog or other animal infected, or suspected of being infected, with rabies; bite or injury by dog, cat, or other animal; dog, cat, or other animal bitten by known or suspected rabid animal.)

Ill.	N. J.	N. Y.	N. C.	N. Dak.	Ohio

Dog bite:

Ark.	Mass.	Mich.	N. H.	R. I.

Drug addictions or habits:

N. Mex.

Dysentery:
(Infective types of dysentery other than amebic and bacillary; acute dysentery; epidemic dysentery.)

Ill.	Utah	Vt.	Va.

Dysentery (amebic):
(Amebiasis; epidemic dysentery (bacillary or amebic dysentery).)

Ala.	D. C.	Iowa	Mich.	N. H.	Okla.	Tenn.
Ariz.	Fla.	Kans.	Minn.	N. J.	Oreg.	Tex.
Ark.	Ga.	Ky.	Miss.	N. Mex.	Pa.	Wash.
Calif.	Hawaii	La.	Mo.	N. Y.	P. R.	W. Va.
Colo.	Idaho	Maine	Mont.	N. Dak.	R. I.	Wis.
Conn.	Ill.	Md.	Nebr.	Ohio	S C.	Wyo.
Del.	Ind.	Mass.	Nev.			

Dysentery (bacillary):
(Epidemic dysentery (bacillary or amebic dysentery).)

Ala.	D. C.	Iowa	Mich.	Nev.	Ohio	S. C.
Ariz.	Fla.	Kans.	Minn.	N. H.	Okla.	Tenn.
Ark.	Ga.	Ky.	Miss.	N. J.	Oreg.	Tex.
Calif.	Hawaii	La.	Mo.	N. Mex.	Pa.	Wash.
Colo.	Idaho	Maine	Mont.	N. Y.	P. R.	W. Va.
Conn.	Ill.	Md.	Nebr.	N. C.	R. I.	Wyo.
Del.	Ind.	Mass.				

Echinococcus:

Wash.

Encephalitis (infectious):

(Lethargic encephalitis; lethargic and nonlethargic infectious encephalitis; encephalitis; epidemic encephalitis; epidemic lethargic encephalitis; acute encephalitis; epidemic encephalitis (all types); acute infectious encephalitis; lethargic and other infectious encephalitis; encephalitis infection (lethargic and nonlethargic); encephalitis (Type A, Type B, St. Louis type); equine encephalitis.)

Ala.	D. C.	Iowa	Mich.	N. Mex.	P. R.	Va.
Ariz.	Fla.	Kans.	Minn.	N. Y.	R. I.	Wash.
Ark.	Ga.	Ky.	Mo.	N. Dak.	S. C.	W. Va.
Calif.	Hawaii	La.	Nebr.	Ohio	Tenn.	Wis.
Colo.	Idaho	Maine	Nev.	Okla.	Tex.	Wyo.
Conn.	Ill.	Md.	N. H.	Oreg.	Utah	
Del.	Ind.	Mass.	N. J.	Pa.		

Enterocolitis. (*See* Diarrhea; diarrhea (infantile).)

Epilepsy: (*See also* Mental deficiency or epilepsy.)

(Epilepsy or similar disorders characterized by lapses of consciousness.)

Calif.	Wyo.

Erysipelas:

Alaska	Fla.	Ind.	Mich.	Nev.	S. Dak.	Vt.
Ark.	Hawaii	Kans.	Minn.	N. Dak	Tenn.	Wash.
Colo.	Idaho	Ky.	Mont.	Ohio	Utah	Wis.
D. C.	Ill.	La.	Nebr.	Oreg.		

Favus:

Ala.	Fla.	Iowa	Mich.	Mont.	Ohio	Vt.
Colo.	Ga.	Kans.	Minn.	N. Mex.	Oreg.	Wash.
Conn.	Idaho	Ky.	Mo.	N. Dak.	S. C.	Wyo.
Del.	Ill.					

Filariasis:

Ga.	Iowa	N. Mex.	Ohio	Oreg.	P. R.	Wash.
Idaho						

Food infections and poisonings: (*See also* Botulism.)

(Illness (group of cases) believed due to consumption of spoiled or poisonous food; food poisoning; food poisoning or infection; forms of food poisoning other than botulism; illness (group of cases) believed due to food; mass food poisoning; food poisoning (multiple cases); alimentary infections (caused by taking foods contaminated with bacilli of the salmonicidus [Salmonella] group, bacilli botulinus, staphylococci, etc.); outbreak of food poisoning; food infections.)

Ariz.	D. C.	Iowa	Mass.	N. H.	Ohio	Va.
Ark.	Ga.	Kans.	Mont.	N. Mex.	Oreg.	Wash.
Calif.	Idaho	La.	Nebr.	N. Y.	P. R.	Wyo.
Colo.	Ill.	Maine	Nev.	N. Dak.	Tenn.	

Foot-and-mouth disease:

Colo.[1]	Mo.[1]	Nebr.[1]	Ohio

[1] In animals.

Gastroenteritis (when Asiatic cholera is present or its importation threatened):

(Cholera nostras.)

Ala.	Kans.

German measles:

(Rubella; rubeola (epidemic roseola).)

Ala.	Fla.	Iowa	Mass.	N. H.	Okla.	Utah
Ariz.	Ga.	Kans.	Mich.	N. J.	Oreg.	Vt.
Ark.	Hawaii	Ky.	Mo.	N. Mex.	Pa.	Wash.
Calif.	Idaho	La.	Mont.	N. C.	P. R.	W. Va.
Conn.	Ill.	Maine	Nebr.	N. Dak.	S. C.	Wis.
Del.	Ind.	Md.	Nev.	Ohio	Tenn.	Wyo.
D. C.						

Glanders:

Ala.	D. C.	Iowa	Mich.	N. H.	Oreg.	Tenn.
Alaska	Fla.	Kans.	Minn.	N. J.	Pa.	Utah
Ariz.	Ga.	Ky.	Mo.[1]	N. Mex.	P. R.	Vt.
Calif.	Hawaii	La.	Mont.	N. Y.	R. I.	Wash.
Colo.	Idaho	Maine	Nebr.[1]	N. Dak.	S. C.	W. Va.
Conn.	Ill.	Mass.	Nev.	Ohio	S. Dak.	Wyo.
Del.	Ind.					

[1] Glanders in animals is also reportable.

Gonorrhea: (*See also* Venereal diseases.)

(Gonococcus infection; gonococcal infections; gonorrhea (genitourinary); gonorrheal vulvovaginitis.)

Ala.	D. C.	Kans.	Minn.	N. J.	Oreg.	Utah
Alaska	Fla.	Ky.	Miss.	N. Mex.	P. R.	Vt.
Ariz.	Ga.	La.	Mo.	N. Y.	R. I.	Va.
Ark.	Hawaii	Maine	Mont.	N. C.	S. C.	Wash.
Calif.	Idaho	Md.	Nebr.	N. Dak.	S. Dak.	W. Va.
Colo.	Ill.	Mass.	Nev.	Ohio	Tenn.	Wis.
Conn.	Ind.	Mich.	N. H.	Okla.	Tex.	Wyo.
Del.	Iowa					

Granuloma venereum: (*See also* Venereal diseases.)

(Granuloma inguinale.)

Ala.	Ill.	La.	Miss.	N. H.	Okla.	Tenn.
Ariz.	Kans.	Maine	Nev.	Ohio	S. C.	Wyo.
Calif.	Ky.	Mich.				

Heat prostration:

N. Mex.

Hemorrhagic jaundice:

(Infectious jaundice; icterohemorrhagic jaundice; epidemic jaundice; jaundice (Weil's disease); Weil's disease; outbreak of infectious jaundice; jaundice (infectious or epidemic types).)

Ariz.	Ga.	Iowa	Mass.	Nebr.	Ohio	Va.
Calif.	Hawaii	La.	Mich.	Nev.	Oreg.	Wash.
Del.	Idaho	Maine	Minn.	N. Dak.	Utah	Wyo.
Fla.	Ill.					

Hepatitis (infectious):

Ill.	Ind.	Iowa

Hookworm disease:

(Ancylostomiasis; hookworm infection; hookworm.)

Ariz.	D. C.	Ill.	La.	Miss.	Okla.	Tenn.
Ark.	Fla.	Ind.	Maine	Mo.	Oreg.	Utah
Colo.	Ga.	Iowa	Mass.	N. Mex.	S. C.	Wash.
Conn.	Hawaii	Kans.	Mich.	N. Dak.	S. Dak.	W. Va
Del.	Idaho	Ky.	Minn.	Ohio		

Impetigo contagiosa:

(Impetigo contagiosa (in institutions); impetigo; impetigo contagiosa (without medical attention).)

Colo.	Hawaii	Ill.	Iowa	Mich.	N. Dak.	Oreg.
Ga.	Idaho	Ind.	Ky.	Nebr.	Ohio	Wash.

Infantile paralysis. (*See* Poliomyelitis.)

Infectious diseases of the skin:

Del.

Influenza:

(Epidemic influenza; influenza (upon laboratory confirmation).)

Ala.	Del.	Ind.	Mich.	N. J.	P. R.	Vt.
Alaska	D. C.	Iowa	Minn.	N. Mex.	R. I.	Va.
Ariz.	Fla.	Kans.	Miss.	N. C.	S. C.	Wash.
Ark.	Ga.	Ky.	Mo.	N. Dak.	S. Dak	W. Va.
Calif.	Hawaii	La.	Mont.	Ohio	Tenn.	Wis.
Colo.	Idaho	Maine	Nebr.	Okla.	Tex.	Wyo.
Conn.	Ill.	Md.	Nev.	Oreg.	Utah	

Jaundice. (*See* Hemorrhagic jaundice; hepatitis (infectious).)

Keratoconjunctivitis (infectious):

(Epidemic keratoconjunctivitis.)

Ill.	Ind.	Iowa	Maine	Mich.	Tenn.

Leprosy:

Ala.	Del.	Ind.	Mass.	Nev.	Oreg.	Tex.
Alaska	D. C.	Iowa	Mich.	N. H.	Pa.	Utah
Ariz.	Fla.	Kans.	Minn.	N. J.	P. R.	Vt.
Ark.	Ga.	Ky.	Miss.	N. Mex.	R. I.	Wash.
Calif.	Hawaii	La.	Mo.	N. Dak.	S. C.	W. Va.
Colo.	Idaho	Maine	Mont.	Ohio	S. Dak.	Wis.
Conn.	Ill.	Md.	Nebr.	Okla.	Tenn.	Wyo.

Lymphocytic choriomeningitis:

Ill.	Ky.	Mass.	Tenn.

Lymphogranuloma venereum: (*See also* Venereal diseases.)

(Lymphogranuloma inguinale; lymphogranuloma venereum (inguinale) and climatic bubo; lymphopathia venereum.)

Ala.	Fla.	Iowa	Maine	N. H.	Oreg.	Tenn.
Ariz.	Ga.	Kans.	Mich.	N. Dak.	R.I.	Wash.
Calif.	Idaho	Ky.	Miss.	Ohio	S.C.	Wyo.
D. C.	Ill.	La.	Nev.	Okla.		

Malaria:

(Malarial fever.)

Ala.	Fla.	Kans.	Minn.	N. J.	Oreg.	Tex.
Ariz.	Ga.	Ky.	Miss.	N. Mex.	Pa.	Utah
Ark.	Hawaii	La.	Mo.	N. Y.	P. R.	Va.
Calif.	Idaho	Maine	Mont.	N. C.	R. I.	Wash.
Colo.	Ill.	Md.	Nebr.	N. Dak.	S. C.	W. Va.
Conn.	Ind.	Mass.	Nev.	Ohio	S. Dak.	Wis.
Del.	Iowa	Mich.	N. H.	Okla.	Tenn.	Wyo.
D. C.						

Malta fever. (*See* Undulant fever.)

Measles:

Ala.	D. C.	Kans.	Miss.	N. Y.	R. I.	Wash.
Alaska	Fla.	Ky.	Mo.	N. C.	S. C.	W. Va.
Ariz.	Ga.	La.	Mont.	N. Dak.	S. Dak.	Wis.
Ark.	Hawaii	Maine	Nebr.	Ohio	Tenn.	Wyo.
Calif.	Idaho	Md.	Nev.	Okla.	Tex.	
Colo.	Ill.	Mass.	N. H.	Oreg.	Utah	
Conn.	Ind.	Mich.	N. J.	Pa.	Vt.	
Del.	Iowa	Minn.	N. Mex.	P. R.	Va.	

Meningitis (influenzal):

Mich.

Meningitis (other than meningococcus meningitis):
(Meningitis (pneumococcus, streptococcus, syphilitic, tuberculous, unspecified).)

Ill.	Mass.	Miss.	Wyo.

Meningitis (tuberculous):
(Tubercular meningitis; meningitis (tuberculosis).)

Ala.	Kans.	Maine	Mont.	R. I.	S. C.

Meningococcemia (septicemia):

N. Y.

Meningococcus meningitis:
(Epidemic cerebrospinal meningitis; cerebrospinal meningitis; meningococcic meningitis; epidemic meningitis; meningococcal meningitis; meningitis (due to the meningococcus).)

Ala.	D. C.	Kans.	Miss.	N. Mex.	Pa.	Utah
Alaska	Fla.	Ky.	Mo.	N. Y.	P. R.	Vt.
Ariz.	Ga.	La.	Mont.	N. C.	R. I.	Va.
Ark.	Hawaii	Maine	Nebr.	N. Dak.	S. C.	Wash.
Calif.	Idaho	Md.	Nev.	Ohio	S. Dak.	W. Va.
Colo.	Ill.	Mass.	N. H.	Okla.	Tenn.	Wis.
Conn.	Ind.	Mich	N. J.	Oreg.	Tex.	Wyo.
Del.	Iowa	Minn.				

Mental deficiency or epilepsy: (*See also* Epilepsy.)

N. J.

Milk sickness:

Ohio.

Mumps:
(Epidemic parotitis.)

Ala.	Del.	Ind.	Mass.	N. H.	Pa.	Utah
Alaska	D. C.	Iowa	Mich.	N. J.	P. R.	Vt.
Ariz.	Fla.	Kans.	Miss.	N. Mex.	R. I.	Wash.
Ark.	Ga.	Ky.	Mo.	N. Dak.	S. C.	W. Va.
Calif.	Hawaii	La	Mont.	Ohio	Tenn.	Wis.
Colo.	Idaho	Maine	Nebr.	Okla.	Tex.	Wyo.
Conn.	Ill.	Md.	Nev.	Oreg.		

Ophthalmia neonatorum. (*See* Conjunctivitis (acute infectious).)

Paragonimiasis:

Ala.	Minn.

Paratyphoid fever:
(Paratyphoid fever (A and B); paratyphoid fever and all other Salmonella infections.)

Ala.	D. C.	Kans.	Mich.	N. H.	Ohio	Tenn.
Ariz.	Fla.	Ky.	Minn.	N. J.	Okla.	Tex.
Ark.	Ga.	La.	Mo.	N. Mex.	Oreg.	Utah
Calif.	Hawaii	Maine	Mont.	N. Y.	Pa.	Va.
Colo.	Idaho	Md.	Nebr.	N. C.	P. R.	W. Va.
Conn.	Ill.	Mass.	Nev.	N. Dak.	R. I.	Wyo.
Del.	Iowa					

Pediculosis:

Ga.	Idaho	Iowa	Mich.	Nebr.	Ohio	Oreg.

Pellagra: (*See also* Avitaminosis.)

Ala.	Idaho	Ky.	Miss.	N. C.	R. I.	Tex.
Ariz.	Ill.	La.	Mo.	N. Dak.	S. C.	Utah
Ark.	Ind.	Maine	Mont.	Ohio	S. Dak.	Va.
Fla.	Iowa	Md.	Nev.	Okla.	Tenn.	W. Va.
Ga.	Kans.	Minn.	N. Mex.	Pa.		

Physical defect:
(Deafness or impaired hearing in child under 20; any physical defect in child under 5; physical handicap in child under 21 (for whom application is made for admission to certain institutions); visible congenital deformities (in newborn); defect, injury, or disease of a continuous nature or which might permanently handicap (in child, not under 1, of preschool age or of school age but not attending school); impairment of hearing (evidenced by child under 16 for 6 months or more); defective vision which may result in permanent blindness; total deafness or impaired hearing in any minor under 6; deafness or indications of being or becoming hard of hearing in child between 4 and 16.)

Calif.	Hawaii	Minn.	N. H.	N. J.	N. Y.	Pa.	R. I.
Conn.							

Pink eye. (*See* Conjunctivitis (acute infectious).)

Plague:
(Bubonic plague; septicemic plague; pneumonic plague; Oriental plague.)

Ala.	D. C.	Kans.	Minn.	N. J.	Oreg.	Tex.
Alaska	Fla.	Ky.	Miss.	N. Mex.	Pa.	Utah
Ariz.	Ga.	La.	Mo.	N. Y.	P. R.	Vt.
Ark.	Hawaii	Maine	Mont.	N. C.	R. I.	Wash.
Calif.	Idaho	Md.	Nebr.	N. Dak.	S. C.	W. Va.
Colo.	Ill.	Mass.	Nev.	Ohio	S. Dak.	Wis.
Conn.	Ind.	Mich.	N. H.	Okla.	Tenn.	Wyo.
Del.	Iowa					

[illegible]a:

(Acute pneumonia; acute lobar pneumonia; pneumonia (all forms); infectious pneumonia; [illegible] pneumonia; lobar pneumonia; pneumonia (a. pneumococcus and other primary forms, b. s[illegible] pneumonias complicating infectious diseases); pneumonia (pneumococcic); bronchial pneumonia; pneumonia following influenza and measles; croupous pneumonia; pneumonia (other than acute lobar); pneumonia (unspecified).)

Ala.	Fla.	Kans.	Minn.	N. J.	Pa.	Utah
Ariz.	Ga.	Ky.	Miss.	N. Mex.	P. R.	Vt.
Ark.	Hawaii	La.	Mo.	N. Y.	R. I.	Va.
Calif.	Idaho	Maine	Mont.	N. Dak.	S. C.	Wash.
Colo.	Ill.	Md.	Nebr.	Ohio	S. Dak.	W. Va.
Conn.	Ind.	Mass.	Nev.	Okla.	Tenn.	Wis.
Del.	Iowa	Mich.	N. H.	Oreg.	Tex.	Wyo.
D. C.						

Poliomyelitis:

(Acute infectious poliomyelitis; infantile paralysis; acute anterior poliomyelitis; anterior poliomyelitis (paralytic, nonparalytic (preparalytic)); anterior poliomyelitis; acute poliomyelitis.)

Ala.	D. C.	Kans.	Miss.	N. Mex.	Pa.	Utah
Alaska	Fla.	Ky.	Mo.	N. Y.	P. R.	Vt.
Ariz.	Ga.	La.	Mont.	N. C.	R. I.	Va.
Ark.	Hawaii	Maine	Nebr.	N. Dak.	S. C.	Wash.
Calif.	Idaho	Md.	Nev.	Ohio	S. Dak.	W. Va.
Colo.	Ill.	Mass.	N. H.	Okla.	Tenn.	Wis.
Conn.	Ind.	Mich.	N. J.	Oreg.	Tex.	Wyo.
Del.	Iowa	Minn.				

Psittacosis:

Ariz.	D. C.	Ind.	Md.	Nev.	N. Dak.	P. R.
Ark.	Fla.	Iowa	Mass.	N. H.	Ohio	R. I.
Calif.	Ga.	Kans.	Mich.	N. Mex.	Okla.	Tenn.
Colo.	Hawaii	Ky.	Minn.	N. Y.	Oreg.	Wash.
Conn.	Idaho	La.	Mo.	N. C.	Pa.	Wyo.
Del.	Ill.	Maine	Mont.			

Puerperal infection:

(Puerperal septicemia; puerperal fever; puerperal sepsis; puerperal streptococcic infections; fever in lying-in woman.)

Ariz.	D. C.	Iowa	Mich.	N. Mex.	Oreg.	Vt.
Ark.	Fla.	Ky.	Miss.	N. Dak.	P. R.	Wash.
Colo.	Ga.	La.	Mo.	Ohio	S. Dak.	Wyo.
Del.	Idaho	Md.	Nev.	Okla.	Tenn.	

Rabies:

(Rabies (human cases and exposed persons); hydrophobia.)

Ala.	D. C.	Kans.	Minn.	N. J.[1]	Oreg.	Tenn.
Ariz.	Fla.[1]	Ky.	Miss.[2]	N. Mex.[1]	Pa.	Utah
Ark.	Ga.	La.[1]	Mo.[1]	N. Y.	P. R.	Vt.
Calif.[1]	Idaho	Maine	Mont.	N. C.	R. I.	Wash.
Colo.[1]	Ill.	Md.	Nebr.[1]	N. Dak.	S. C.	W. Va.
Conn.	Ind.[1]	Mass.	Nev.	Ohio	S. Dak.	Wyo.
Del.[1]	Iowa	Mich.[1]	N. H.	Okla.		

[1] Rabies in animals is also reportable.
[2] Only rabies in animals is reportable.

Rat-bite fever:

Ga.	Iowa	La.	Ohio	Tenn.	Wash.	Wyo.
Idaho	Ky.	N. Dak.	Oreg.			

Relapsing fever:

Ariz.	Idaho	La.	N. Mex.	Ohio	Pa.	Wash.
Calif.	Iowa	Nev.	N. Dak.	Oreg.	Tex.	Wyo.
Ga.	Ky.					

Rheumatic fever:

(Acute rheumatism; acute rheumatic fever.)

Ariz.	D. C.	Iowa	Mich.	R. I.	Utah	Wyo.
Calif.	Ill.	Md.				

Rheumatic heart disease:

Md.

Rickettsial diseases:

(Rickettsial diseases (Brill's or endemic typhus, Rocky Mountain spotted fever).)

Fla.

Ringworm:

(Epidermophytosis.)

Ga.	Iowa	Ky.	Mich.	Ohio	Oreg.	Wash.
Idaho						

Rocky Mountain spotted (or tick) fever:

(Rocky Mountain spotted fever; Rocky Mountain spotted fever (eastern type).)

Ala.	D. C.	Kans.	Minn.	N. J.	Okla.	Tenn.
Ariz.	Fla.	Ky.	Miss.	N. Mex.	Oreg.	Utah
Ark.	Ga.	La.	Mo.	N. Y.	Pa.	Va.
Calif.	Idaho	Maine	Mont.	N. C.	R. I.	Wash.
Colo.	Ill.	Md.	Nebr.	N. Dak.	S. C.	W. Va.
Conn.	Ind.	Mass.	Nev.	Ohio	S. Dak.	Wyo.
Del.	Iowa	Mich.	N. H.			

Scabies:

Colo.	Idaho	Ky.	Mich.	N. Dak.	Ohio	Oreg.
Ga.	Iowa					

Scarlet fever:

Ala.	D. C.	Kans.	Minn.	N. J.	Oreg.	Tex.
Alaska	Fla.	Ky.	Miss.	N. Mex.	Pa.	Utah
Ariz.	Ga.	La.	Mo.	N. Y.	P. R.	Vt.
Ark.	Hawaii	Maine	Mont.	N. C.	R. I.	Va.
Calif.	Idaho	Md.	Nebr.	N. Dak.	S. C.	Wash.
Colo.	Ill.	Mass.	Nev.	Ohio	S. Dak.	W. Va.
Conn.	Ind.	Mich.	N. H.	Okla.	Tenn.	Wis.
Del.	Iowa					Wyo.

Schistosomiasis:
(Clonorchiasis.)

Ga.	Hawaii	Idaho	Iowa	Ohio	Oreg.	Wash.

Scurvy: (*See also* Avitaminosis.)

Ala.	Mo.

Septic sore throat:
(Septic sore throat (epidemic); streptococcus sore throat; streptococcus sore throat (epidemic); streptococcic sore throat; streptococcus (septic) sore throat; streptococcic sore throat (acute); epidemic or septic sore throat; epidemic or streptococcus (septic) sore throat; epidemic streptococcus angina; epidemic or streptococcic sore throat; septic sore throat in epidemic form; hemolytic streptococcus sore throat.)

Ala.	D. C.	Iowa	Mich.	N. J.	Oreg.	Vt.
Ariz.	Fla.	Kans.	Minn.	N. Mex.	P. R.	Va.
Ark.	Ga.	Ky.	Mo.	N. Y.	R. I.	Wash.
Calif.	Hawaii	La.	Mont.	N. C.	S. C.	W. Va.
Colo.	Idaho	Maine	Nebr.	N. Dak.	S. Dak.	Wis.
Conn.	Ill.	Md.	Nev.	Ohio	Tenn.	Wyo.
Del.	Ind.	Mass.	N. H.	Okla.	Utah	

Smallpox:

Ala.	D. C.	Kans.	Miss.	N. Mex.	Pa.	Utah
Alaska	Fla.	Ky.	Mo.	N. Y.	P. R.	Vt.
Ariz.	Ga.	La.	Mont.	N. C.	R. I.	Va.
Ark.	Hawaii	Maine	Nebr.	N. Dak.	S. C.	Wash.
Calif.	Idaho	Md.	Nev.	Ohio	S. Dak.	W. Va.
Colo.	Ill.	Mass.	N. H.	Okla.	Tenn.	Wis.
Conn.	Ind.	Mich.	N. J.	Oreg.	Tex.	Wyo.
Del.	Iowa	Minn.				

Sporotrichosis:

Ky.

Syphilis: (*See also* Venereal diseases.)
(Cutaneous syphilis.)

Ala.	D. C.	Kans.	Miss.	N. Mex.	Pa.	Utah
Alaska	Fla.	Ky.	Mo.	N. Y.	P. R.	Vt.
Ariz.	Ga.	La.	Mont.	N. C.	R. I.	Va.
Ark.	Hawaii	Maine	Nebr.	N. Dak.	S. C.	Wash.
Calif.	Idaho	Md.	Nev.	Ohio	S. Dak.	W. Va.
Colo.	Ill.	Mass.	N. H.	Okla.	Tenn.	Wis.
Conn.	Ind.	Mich.	N. J.	Oreg.	Tex.	Wyo.
Del.	Iowa	Minn.				

Tetanus:
(Tetanus (including tetanus neonatorum); tetanus (including tetanus infantum).)

Ala.	D. C.	Iowa	Mich.	N. J.	Oreg.	Utah
Ariz.	Fla.	Kans.	Minn.	N. Mex.	P. R.	Vt.
Ark.	Ga.	Ky.	Mo.	N. Y.	R. I.	Va.
Calif.	Hawaii	La.	Mont.	N. Dak.	S. C.	Wash.
Colo.	Idaho	Maine	Nebr.	Ohio	S. Dak.	W. Va.
Conn.	Ill.	Md.	Nev.	Okla.	Tenn.	Wyo.
Del.	Ind.	Mass.	N. H.			

Tick paralysis:

Mont.

Trachoma:

Ala.	D. C.	Iowa	Mich.	N. H.	Oreg.	Utah
Alaska	Fla.	Kans.	Minn.	N. J.	Pa.	Vt.
Ariz.	Ga.	Ky.	Miss.	N Mex.	R. I.	Va.
Ark.	Hawaii	La.	Mo.	N. C.	S. C.	Wash.
Calif.	Idaho	Maine	Mont.	N. Dak.	S. Dak.	W. Va.
Colo.	Ill.	Md.	Nebr.	Ohio	Tenn.	Wis.
Conn.	Ind.	Mass.	Nev.	Okla.	Tex.	Wyo.
Del.						

Trichinosis:
(Trichiniasis.)

Ala.	Del.	Ill.	Md.	Nebr.	N. Dak.	S. Dak.
Ariz.	D. C.	Iowa	Mass.	Nev.	Ohio	Tenn.
Ark.	Fla.	Kans.	Mich.	N. H.	Oreg.	Utah
Calif.	Ga.	Ky.	Minn.	N. J.	Pa.	Wash.
Colo.	Hawaii	La.	Mo.	N. Mex.	R. I.	W. Va.
Conn.	Idaho	Maine	Mont.	N. Y.	S. C.	Wyo.

Tuberculosis:
(Tuberculosis (all forms); tuberculosis in any form; tuberculosis (all forms, including "miner's consumption"); tuberculosis (except primary); tuberculosis (excluding childhood type); tuberculosis (of any *organ*).)

Ala.	Hawaii	Md.	Mont.	N. Y.	S. C.	Vt.
Alaska	Ind.	Mass.	Nebr.[2]	N. C.	S. Dak.	Va.
Calif.	Kans.	Mich.	N. H.	Pa.	Tenn.	W. Va.
D. C.	Ky.	Minn.	N. J.	P. R.	Tex.	Wis.
Fla.	Maine	Mo.[1]	N. Mex.	R. I.	Utah	

[1] This has reference only to tuberculosis in animals.
[2] Tuberculosis in animals is also reportable.

Tuberculosis (other than pulmonary):
(Tuberculosis not of the lungs.)

Ariz.	Conn.	Idaho	La.	Nev.	Okla.	Wash.
Ark.	Del.	Ill.	Miss.	N. Dak	Oreg.	Wyo.
Colo.	Ga.	Iowa	Mo.	Ohio		

Tuberculosis (pulmonary):
(Tuberculosis of the lungs; acute pulmonary tuberculosis.)

Alaska	Colo.	Ga.	Iowa	Mo.	Ohio	Wash.
Ariz.	Conn.	Idaho	La.	Nev.	Okla.	W. Va.
Ark.	Del.	Ill.	Miss	N. Dak.	Oreg.	Wyo.

Tularemia:

Ala.	D. C.	Iowa	Mich.	N. H.	Okla.	Tenn.
Ariz.	Fla.	Kans.	Minn.	N. J.	Oreg.	Utah
Ark.	Ga.	Ky.	Miss.	N. Mex	Pa.	Va.
Calif.	Hawaii	La.	Mo.	N. Y.	P. R.	Wash.
Colo.	Idaho	Maine	Mont.	N. C.	R. I.	W. Va.
Conn.	Ill.	Md.	Nebr.	N. Dak.	S. C.	Wis.
Del.	Ind.	Mass.	Nev.	Ohio	S. Dak	Wyo.

Typhoid fever: (*See also* Cholecystitis of typhoid origin.)
(Typhoid fever group.)

Ala.	D. C.	Kans.	Miss.	N. Mex	Pa.	Utah
Alaska	Fla.	Ky.	Mo.	N. Y.	P. R.	Vt.
Ariz.	Ga.	La.	Mont.	N. C.	R. I.	Va.
Ark.	Hawaii	Maine	Nebr.	N. Dak	S. C.	Wash.
Calif.	Idaho	Md.	Nev.	Ohio	S. Dak.	W. Va.
Colo.	Ill.	Mass.	N. H.	Okla.	Tenn.	Wis.
Conn.	Ind.	Mich.	N. J.	Oreg	Tex.	Wyo
Del.	Iowa	Minn.				

Typhus fever:
(Brill's or endemic typhus; typhus fever (endemic); typhus fever (epidemic); typhus fever (epidemic or louse-borne); typhus fever (endemic or flea-borne); exanthematous typhus.)

Ala.	D. C.	Iowa	Mich.	N. H.	Oreg.	Tex.
Alaska	Fla.	Kans.	Minn.	N. J	Pa.	Utah
Ariz.	Ga.	Ky.	Miss.	N. Mex.	P. R.	Vt.
Ark.	Hawaii	La.	Mo.	N. Y.	R. I.	Va.
Calif.	Idaho	Maine	Mont.	N. C.	S. C.	Wash.
Colo.	Ill.	Md.	Nebr.	Ohio	S. Dak.	Wis.
Conn.	Ind.	Mass.	Nev.	Okla.	Tenn.	Wyo.
Del.						

Undulant fever:
(Brucellosis; Malta or undulant fever; undulant fever and Malta fever; Malta fever; Malta (undulant) fever.)

Ala.	Fla.	Ky.	Miss.	N. Mex.	Pa.	Utah
Ariz.	Ga.	La.	Mo.	N. Y.	P. R.	Vt.
Ark.	Hawaii	Maine	Mont.	N. C.	R. I.	Va
Calif.	Idaho	Md.	Nebr.[1]	N. Dak.	S. C.	Wash.
Colo.	Ill.	Mass.	Nev.	Ohio	S. Dak.	W. Va.
Conn.	Ind.	Mich.	N. H.	Okla.	Tenn.	Wis.
Del.	Iowa	Minn.	N. J.	Oreg.	Tex.	Wyo.
D. C.	Kans.					

[1] Bang's disease in animals is also reportable.

Venereal diseases: (*See also* Chancroid; gonorrhea; granuloma venereum; lymphogranuloma venereum; syphilis.)
(All venereal diseases (including chancroid, gonorrhea, and syphilis); any venereal disease; venereal diseases (in known prostitutes refusing treatment); venereal diseases (other than syphilis, gonorrhea, chancroid); venereal diseases in any form (in charitable patients in public institutions).)

Ark.	Kans.	N. Mex.	Okla.	Tenn.	Vt.

Vincent's infection:
(Vincent's angina; acute Vincent's infection.)

Fla.	Ind.	Maine	Nev.	N. Dak.	P. R.	Vt.
Ga.	Iowa	Mich.	N. H.	Ohio	R. I.	Wash.
Idaho	Kans.	Minn.	N. C.	Oreg.	Tenn.	Wyo.
Ill.[1]	Ky.					

[1] Other infectious anginas are also required to be reported.

Whooping cough:
(Pertussis.)

Ala.	D. C.	Kans.	Miss.	N. Mex.	Pa.	Utah
Alaska	Fla.	Ky.	Mo.	N. Y.	P. R.	Vt.
Ariz.	Ga.	La.	Mont.	N. C.	R. I.	Va.
Ark.	Hawaii	Maine	Nebr.	N. Dak.	S. C.	Wash.
Calif.	Idaho	Md.	Nev.	Ohio	S. Dak.	W. Va.
Colo.	Ill.	Mass.	N. H.	Okla.	Tenn.	Wis.
Conn.	Ind.	Mich.	N. J.	Oreg.	Tex.	Wyo.
Del.	Iowa	Minn.				

Yaws:
(Tropical frambesia (buboes).)

Ga.	Idaho	Iowa	Nev.	Ohio	Oreg.	P. R.

Yellow fever:

Ala.	Del.	Ind.	Mass.	N. H.	Oreg.	Tex.
Alaska	D. C.	Iowa	Mich.	N. J.	Pa.	Utah
Ariz.	Fla.	Kans.	Minn.	N. Mex.	P. R.	Vt.
Ark.	Ga.	Ky.	Miss.	N. C.	R. I.	Wash.
Calif.	Hawaii	La.	Mo.	N. Dak.	S. C.	W. Va.
Colo.	Idaho	Maine	Mont.	Ohio	S. Dak.	Wis.
Conn.	Ill.	Md.	Nebr.	Okla.	Tenn.	Wyo.

Diseases and conditions primarily due to, or resulting from, the nature of the occupation or employment

Acid poisoning (other than those specified):
Iowa

Ammonia poisoning:
Iowa Ky.

Aniline poisoning:
Colo. Mo. Ohio Wash.

Anthracosis:
Pa.

Anthrax. (*See* Anthrax under "Communicable diseases and certain other conditions.")

Arsenic poisoning:

Ala.	Kans.	Md.	N. H.	N. Y.	Pa.	Wash.
Conn.	Ky.	Minn.	N. Mex.	Ohio	R. I.	Wis.
Iowa	Maine	Mo.				

Asbestosis:
Ky. N. Mex. S. C.

Benzene (benzol) poisoning:
(Benzol (benzene) poisoning; poisoning by benzol or nitro-, hydro-, hydroxy-, and amido- derivatives of benzene (dinitrobenzol, anilin, and others); benzol poisoning (nitro-, hydroxy-, and amido- derivatives of benzene); benzol poisoning; poisoning by benzol or by nitro- and amido- derivatives of benzol (dinitrobenzol, anilin, and others).)

Colo.	Ky.	Mo.	N. Mex.	Ohio	S. C.	Wash.
Iowa						

Benzine poisoning:
(Poisoning by gasoline, benzine, or other volatile products; benzine (gasoline) poisoning; poisoning by gasoline, benzine, naphtha, or other volatile petroleum products.)

Colo. Mo. N. Mex. Ohio S. C. Wash.

Blisters or abrasions (disability from):
Ky.

Brass poisoning:

Ala.	Iowa	Minn.	N. H.	N. Y.	Pa.	Wash.
Conn.	Kans.	Mo.	N. Mex.	Ohio	R. I.	

Bursitis:
(Disability from bursitis; prepatellar bursitis.)
Iowa Ky. N. Mex.

Cadmium poisoning:
Colo. Iowa Ky.

Carbon bisulfide poisoning:
(Carbon disulfide (bisulfide) poisoning; bisulfide of carbon poisoning; carbon bisulfide (any sulfide); poisoning by carbon bisulfide, methanol, or volatile halogenated hydrocarbons.)

Ala.	Kans.	Mo.	N. Mex.	Pa.	S. C.	Wash.
Colo.	Ky.					

Carbon dioxide poisoning:
N. Mex.

Carbon monoxide poisoning:
(Carbon monoxide asphyxiation; poisoning from carbon monoxide gas.)

Ala.	Iowa	Ky.	Mo.	Ohio	S. C.	Wash.
Colo.	Kans.	Minn.	N. Mex.	Pa.		

Carbon tetrachloride poisoning:
(Poisoning from methyl chloride, carbon tetrachloride, or any organic halide or solvent.)
Colo. Iowa S. C.

Cataract of glass workers:
(Cataract (glass workers).)
Ky. S. C.

Chlorine poisoning:
Iowa Ky. S. C.

Chrome ulceration:
(Chrome ulceration (nasal and skin).)
Iowa Ky.

Chromic acid poisoning:
Colo.

Chronic ulceration:
N. Mex.

Compressed-air illness:
(Caisson disease.)

Ala.	Ky.	Minn.	N. H.	N. Y.	Pa.	S. C.
Conn.	Maine	Mo.	N. Mex.	Ohio	R. I.	Wis.
Kans.	Md.					

Conjunctivitis and retinitis due to electro- and oxy- acetylene welding or other radiant energy:
Iowa

Cyanide poisoning:
(Poisoning by cyanide or any of its compounds; potassium cyanide poisoning.)
Iowa N. Mex.

Dermatitis:
(Dermatitis (infection or inflammation of the skin on contact surfaces due to oils, cutting compounds or lubricants, dusts, liquids, solids, gases, vapors, or fumes); dermatitis (venenata and general); infection or inflammation of the skin on contact surfaces due to oils, cutting compounds or lubricants, dust, liquids, fumes, gases, or vapors; dermatitis due to irritating oil, cutting compounds or lubricants, chemical dust, liquids, dyes, fumes, gases, or vapors.)
Iowa Ky. N. Mex. S. C.

Dinitrobenzene poisoning:
Ala. Kans. Mo. N. Mex. Ohio Pa. Wash.

Disease or illness due or incident to work declared especially dangerous to health:
Mo.

Diseases or conditions (other than those specifically named) due to nature of employment:

Ala.	Kans.	Md.	Minn.	N. H.	N. Mex.	R. I.
Conn.	Maine					

Epitheliomatous cancer or ulcer:
(Epithelioma (skin or eye) due to pitch, tar, bitumen, mineral oil, or paraffin, or any compound, product, or residue of any of these substances; epitheliomatous cancer or ulcers of skin or eye (pitch, tar, bitumen, mineral oil, paraffin, and their products).)
Iowa Ky.

Formaldehyde poisoning:
(Poisoning by formaldehyde or its preparations; formaldehyde poisoning (formaldehyde preparations).)
Iowa Ky.

Gasoline poisoning:
(Poisoning by gasoline, benzine, or other volatile products; poisoning by gasoline, benzine, naphtha, or other volatile petroleum products.)
Colo. N. Mex. S. C.

Glanders. (*See* Glanders under "Communicable diseases and certain other conditions.")

Hydrochloric acid poisoning:
Iowa Ky. S. C.

Hydrocyanic acid poisoning:
Ky.

Hydrofluoric acid poisoning:
Ky. S. C.

Hydrogen fluoride poisoning:
S. C.

Hydrogen sulfide poisoning:
(Poisoning by hydrogen sulfide or any other sulfide.)
Iowa N. Mex.

Irritating gas poisoning (other than those specified):
Iowa

Lead poisoning:
(Lead poisoning (from water).)

Ala.	Iowa	Maine	Mo.	N. Mex.	Pa.	Wash.
Colo.	Kans.	Md.	N. H.	N. Y.	R. I.	Wis.
Conn.	Ky.	Minn.	N. J.	Ohio	S. C.	

Manganese poisoning:
(Manganese dioxide poisoning.)
Colo. Iowa Ky. N. Mex.

Mercury poisoning:

Ala.	Iowa	Maine	N. H.	N. Y.	Pa.	S. C.
Colo.	Kans.	Md.	N. Mex.	Ohio	R. I.	Wis.
Conn.	Ky.	Minn.				

Metal fume fever:
(Metal fume fever (brass); metal fume fever (zinc fume fever, brass founder's ague, brass chills).)
Colo. Iowa Ky.

Methyl chloride poisoning:
(Poisoning from methyl chloride, carbon tetrachloride, or any organic halide or solvent; methyl chloride poisoning (halogenated hydrocarbons).)
Iowa Ky.

Miners' diseases:
(Miners' diseases (cellulitis, bursitis, tenosynovitis, nystagmus).)
Ky.

Naphtha poisoning:
(Poisoning by gasoline, benzine, naphtha, or other volatile petroleum products.)
Ala. Kans. N. Mex. Ohio Pa. S. C. Wash.
Colo. Mo.

Natural gas poisoning:
Ala. Kans. Mo. N. Mex. Ohio Pa.

Nickel carbonyl poisoning:
Ky.

Nitrous fumes poisoning:
Iowa Ky.

Nitrous gases poisoning:
S. C.

(Diseases resulting from occupation; all occupational or industrial diseases; occupational diseases; any occupational disease.)
Ga. La. Md. Mich. Mont. S. C.

Petroleum poisoning:
(Poisoning from volatile petroleum products (gasoline, benzine, naphtha, etc.); poisoning by petroleum and its compounds and derivatives; poisoning by gasoline, benzine, naphtha, or other volatile petroleum products.)
Iowa N. Mex S. C.

Petroleum worker's disease:
(Petroleum worker's disease (respiratory, gastrointestinal, nerve or eye disorders).)
Ky.

Phosgene poisoning:
S. C.

Phosphorus poisoning:
Ala. Kans. Md. N. H. N. Y. Pa. Wash.
Conn. Ky Minn. N. Mex Ohio R. I. Wis.
Iowa Maine Mo.

Pneumoconiosis:
Ky.

Radium poisoning:
(Radium poisoning or disability due to radioactive properties of substances or Roentgen rays (X-rays); radium poisoning (disability from X-ray or other radioactive substance).)
Iowa Ky. N. Mex.

Refrigerants (poisoning by)
(Poisoning by refrigerants (methyl chloride, ethyl chloride, dichlorethylene, methyl bromide, ethyl bromide, methylene chloride, methyl formate dichlorodifluoromethane, dichlorocethane [sic], monofluoromethane, sulfur dioxide).)
S. C.

Silicatosis:
Iowa S. C.

Silicosis:
(Poisoning from silica dust.)
Colo. Iowa Ky. Minn. N. Mex. S. C. Wash.

Silico-tuberculosis:
Colo.

Sulfur dioxide poisoning:
Iowa N. Mex.

Sulfuric acid poisoning:
Iowa Ky. S. C.

Synovitis (disability from):
Ky.

Tenosynovitis:
Iowa N. Mex.

Tetrachlormethane poisoning:
(Tetrachlormethane poisoning (similar solvents).)
Ky.

Tetraethyl lead poisoning:
Colo. Mo. Wash.

Toluene poisoning:
Colo.

Turpentine poisoning:
Colo. Mo. Ohio Wash.

Wood alcohol poisoning:
(Methyl (wood) alcohol poisoning; poisoning by carbon bisulfide, methanol, or volatile halogenated hydrocarbons.)
Ala. Iowa Minn. N. H. N. Y. Pa. S. C.
Colo. Kans. Mo. N. Mex. Ohio R. I. Wash.
Conn. Ky.

X-rays. (*See* Radium poisoning.)

Zinc poisoning:

Iowa Ky. N. Mex.

Alabama.—*Group A.*—Infectious diseases, viz, actinomycosis, anthrax, chancroid, chickenpox, cholera (Asiatic, also cholera nostras when Asiatic cholera is present or its importation threatened), dengue, diphtheria, dysentery (amebic), dysentery (bacillary), epidemic influenza, favus, German measles, glanders, gonorrhea, granuloma venereum, leprosy, lethargic encephalitis, lymphogranuloma inguinale, malaria, measles, meningitis (epidemic cerebrospinal), meningitis (tuberculous), mumps, ophthalmia neonatorum (conjunctivitis of newborn infants), paragonimiasis (endemic hemoptysis), paratyphoid fever, plague, pneumonia (acute), poliomyelitis (acute infectious), rabies, Rocky Mountain spotted or tick fever, scarlet fever, septic sore throat, smallpox, syphilis, tetanus, trachoma, trichinosis, tuberculosis (all forms, the organ or part affected in each case to be specified), tularemia, typhoid fever, typhus fever, undulant fever, whooping cough, and yellow fever.

Group B.—Occupational diseases and injuries, viz, arsenic poisoning, brass poisoning, carbon monoxide poisoning, lead poisoning, mercury poisoning, natural gas poisoning, phosphorus poisoning, wood alcohol poisoning, naphtha poisoning, bisulfide of carbon poisoning, dinitrobenzene poisoning, caisson disease (compressed-air illness), any other disease or disability of the nature of the person's employment.

Group C.—Diseases due to diet deficiency, viz, pellagra, scurvy.

Group D.—Such other diseases as the State Board of Health may from time to time in its discretion declare to be notifiable diseases. [Code (1940), title 22, secs. 45–51.]

Cancer. [Reg.]

Alaska.—Cerebrospinal meningitis, chancroid, chickenpox, cholera, diphtheria, epidemic influenza, erysipelas, glanders, gonorrhea, infantile paralysis, leprosy, measles, mumps, other epidemics, plague, pulmonary tuberculosis, scarlet fever, smallpox, syphilis, trachoma, tuberculosis in any form, typhoid fever, typhus fever, whooping cough, yellow fever. [Compiled Laws (1933), secs. 1667, 1668, 1669, 1673.]

Arizona.—Actinomycosis, anthrax, botulism, chancroid, chickenpox (varicella), acholer, coccidioidomycosis (coccidioidal granuloma—"valley fever"), conjunctivitis (acute infectious of the newborn—not including trachoma), dengue, diphtheria, dysentery (amebic—amebiasis), dysentery (bacillary), encephalitis (infectious—lethargic and nonlethargic), food infections and poisonings, German measles (rubella), glanders, gonorrhea, granuloma inguinale, hemorrhagic jaundice (spirochetosis icterohemorrhagic—Weil's disease), hookworm disease (ancylostomiasis), influenza, leprosy, lymphogranuloma venereum (inguinale—climatic bubo), malaria, measles (rubeola), meningococcus meningitis (cerebrospinal fever), mumps (infectious parotitis), paratyphoid fever, pellagra, plague (*a* bubonic, *b* septicemic, *c* pneumonic), pneumonia (acute lobar), poliomyelitis, psittacosis, puerperal infection (puerperal septicemia), rabies, relapsing fever, rheumatic fever, Rocky Mountain spotted (or tick) fever, scarlet fever (scarlatina), septic sore throat, smallpox (variola), syphilis, tetanus, trachoma, trichinosis, tuberculosis (pulmonary), tuberculosis (other than pulmonary), tularemia, typhoid fever, typhus fever, undulant fever (brucellosis), whooping cough (pertussis), yellow fever. [Reg.]

Statutory citations.—Code (1939), sections 68–303, 68–305.

Arkansas.—Anthrax (in man), cancer, chickenpox, cholera, dengue, diphtheria, dog bite, dysentery (amebic), dysentery (bacillary), epidemic encephalitis (lethargic), erysipelas, German measles, hookworm disease, illness (group of cases) believed due to consumption of spoiled or poisonous food, influenza, leprosy, malaria, measles, meningococcic meningitis, mumps, ophthalmia neonatorum, paratyphoid fever, pellagra, plague (bubonic, pneumonic), pneumonia (all forms), poliomyelitis, psittacosis, puerperal septicemia, rabies (in man), Rocky Mountain spotted fever, scarlet fever, septic sore throat (epidemic), smallpox, tetanus, trachoma, trichinosis, tuberculosis of the lungs, tuberculosis not of the lungs, tularemia, typhoid fever, typhus, undulant fever, venereal diseases (all, including chancroid, gonorrhea, and syphilis), whooping cough, yellow fever. [Reg.]

California.—Amebiasis (amebic dysentery), anthrax, botulism, chancroid, chickenpox (varicella), cholera (Asiatic), coccidioidal granuloma, conjunctivitis (acute infectious of the newborn—ophthalmia neonatorum), dengue, diphtheria, dysentery (bacillary), encephalitis (infectious), epidemic diarrhea of the newborn, epilepsy, food poisoning, German measles (rubella), glanders, gonococcus infection, granuloma inguinale, influenza (epidemic), jaundice (infectious), leprosy, lymphogranuloma venereum (lymphopathia venereum, lymphogranuloma inguinale), malaria, measles (rubeola), meningitis (meningococcic), mumps (parotitis), paratyphoid fever (A and B), plague, pneumonia (infectious), poliomyelitis (acute anterior), psittacosis, rabies (human and animal), relapsing fever, rheumatic fever, Rocky Mountain spotted fever, scarlet fever, septic sore throat (epidemic), smallpox (variola), syphilis, tetanus, trachoma, trichinosis, tuberculosis, tularemia, typhoid fever, typhus fever, undulant fever (brucellosis), whooping cough (pertussis), yellow fever. [Reg.; Business and Professions Code (Deering), secs. 550 (1937), 551 (1941 Supplement); Health and Safety Code (1941), sec. 211; General Laws (Deering, 1937), Act 6264, secs. 3, 11.]

Epilepsy or similar disorders characterized by lapses of consciousness. [Health and Safety Code (1941), sec. 211.]

Deafness or impaired hearing in child under 20. [Education Code, Laws 1943, ch. 71, secs. 17254, 17256.]

Other statutory citations.—Health and Safety Code (1941), sections 2573, 7302.

Colorado.—*Class 1.*—Ancylostomiasis, botulism, cholera, diphtheria, encephalitis, gonorrheal ophthalmia leprosy, meningococcus meningitis, poliomyelitis, plague, rabies, septic sore throat, scarlet fever, smallpox, typhoid, and paratyphoid.

Occupational diseases.—Anthrax, aniline poisoning, benzine poisoning (petroleum ether), benzol (benzene) poisoning, cadmium poisoning, carbon disulfide (bisulfide) poisoning, carbon monoxide asphyxiation, carbon tetrachloride poisoning, chromic acid poisoning, gasoline poisoning, lead poisoning, manganese poisoning, mercury poisoning, metal fume fever (brass), methyl (wood) alcohol poisoning, naphtha poisoning, silicosis, silico-tuberculosis, tetraethyl lead poisoning, toluene poisoning, turpentine poisoning.

Class 2.—Actinomycosis, ancylostomiasis, anthrax, chickenpox, Colorado tick fever, dengue, dysentery (amebic), dysentery (bacillary), erysipelas, favus, food infection and poisoning, glanders, gonorrhea, impetigo contagiosa, influenza, malaria, measles, mumps, pneumonia, psittacosis, puerperal infection, Rocky Mountain spotted fever, scabies, syphilis, tetanus, trachoma, trichinosis, tuberculosis (pulmonary), tuberculosis (other than pulmonary), tularemia, typhoid carriers, typhus fever, undulant fever, whooping cough, yellow fever. [Reg.; Statutes Annotated (1935), ch. 22, sec. 71; ch. 78, secs. 17, 66, 68, 163, 165, 171.]

Chancroid. [Statutes Annotated (1935), ch. 78, secs. 163, 165.]

Anthrax, foot-and-mouth disease, and rabies (hydrophobia) among animals. [Reg.]

Connecticut.—Actinomycosis, amebiasis, anthrax, botulism, brucellosis (undulant fever), chancroid, chickenpox, cholera (Asiatic), conjunctivitis (infectious), diphtheria (all forms), dysentery (bacillary),

encephalitis (epidemic), favus, German measles, glanders, gonorrhea, hookworm infection, influenza (grippe), leprosy, malaria, measles, meningococcus meningitis, mumps, ophthalmia neonatorum, paratyphoid fever, plague, pneumonia (broncho), pneumonia (lobar), poliomyelitis, psittacosis, rabies (in humans), Rocky Mountain spotted fever (East. type), scarlet fever, smallpox, streptococcus sore throat, syphilis, tetanus, trachoma, trichinosis, tuberculosis (pulmonary), tuberculosis (other forms), tularemia, typhoid fever, typhus fever, whooping cough, yellow fever [Reg ; General Statutes (Revision of 1930), secs. 2086, 2620; 1935 Supplement to General Statutes, sec 937c, 1943 Supplement to General Statutes, sec. 518g.]

Any physical defect in child under 5 [1943 Supplement to General Statutes, sec 504g.]

Physical handicap in child under 21 (for whom application is made for admission to certain institutions). [1939 Supplement to General Statutes, sec 602e]

Poisoning from lead, phosphorus, arsenic, brass, wood alcohol, or mercury, or their compounds, anthrax, compressed-air illness, or any other disease contracted as result of nature of employment [1939 Supplement to General Statutes, sec 372e]

Delaware.—Actinomycosis, acute infectious conjunctivitis, ancylostomiasis (hookworm), anthrax, cancer, chancroid, chickenpox, cholera (Asiatic), dengue, diphtheria, dysentery (amebic), dysentery (bacillary), encephalitis (epidemic lethargic), favus, German measles, glanders, gonorrhea, hemorrhagic jaundice (Weil's disease—spirochetosis icterohemorrhagic), infectious diseases of the skin, influenza, leprosy, malaria, Malta or undulant fever, measles, meningococcus meningitis, mumps, paratyphoid fever, plague, pneumonia (acute lobar), poliomyelitis, psittacosis, puerperal fever, rabies in animals, rabies in man, Rocky Mountain spotted fever, scarlet fever, septic sore throat, smallpox, syphilis, tetanus, trachoma, trichinosis, tuberculosis (pulmonary), tuberculosis (other forms), tularemia, typhoid fever, typhus fever (Brill's disease), whooping cough, yellow fever [Reg , Revised Code (1935), secs 778, 779]

Other statutory citations —Revised Code (1935), sections 748, 751, 810

District of Columbia.—Amebiasis (including amebic dysentery), ancylostomiasis (hookworm disease), anthrax, botulism, chancroid, chickenpox (varicella), cholera (Asiatic), conjunctivitis (acute infectious)—(*a*) ophthalmia neonatorum, (*b*) acute suppurative conjunctivitis (suppurative conjunctivitis, pink eye), diarrhea in infants under three weeks, diphtheria, dysentery (bacillary) encephalitis (infectious)—(lethargic and nonlethargic), erysipelas, food poisoning or infection, German measles (rubella or rötheln), glanders, gonococcal infections (gonorrhea), influenza leprosy, lymphogranuloma venereum, malaria, measles (rubella), meningitis (meningococcus)—(epidemic cerebrospinal meningitis), mumps (epidemic parotitis), paratyphoid fever, plague (bubonic and pneumonic) pneumonia (all forms), poliomyelitis (acute anterior poliomyelitis, infantile paralysis), psittacosis (parrot fever), rabies (human), rheumatism (acute), Rocky Mountain spotted fever, scarlet fever (scarlatina), septicemia (puerperal), smallpox (variola), streptococcus sore throat (epidemic)—(septic sore throat) syphilis, tetanus, trachoma, trichinosis, tuberculosis (all forms), tularemia, typhoid fever, typhus fever, undulant fever (Malta fever), whooping cough (pertussis), yellow fever [Reg , Code (1940), sec 6-202]

Other statutory citations —Code (1940), section 33-312

Florida.—Anthrax, beriberi, botulism, cancer, chancroid, chickenpox, cholera (Asiatic), conjunctivitis, dengue, diarrhea (infantile), diphtheria, dysentery (amebic, bacillary), encephalitis (epidemic), erysipelas, German measles, glanders, gonorrhea, hookworm, influenza, jaundice (infectious), leprosy, lymphogranuloma venereum, malaria, measles, meningitis (meningococcic), mumps, mycosis (actinomycosis, blastomycosis, favus), ophthalmia neonatorum, paratyphoid fever, pellagra, plague, pneumonia (broncho, lobar), poliomyelitis, psittacosis, puerperal infection, rabies (human and animal), rickettsial diseases (Brill's or endemic typhus, Rocky Mountain spotted fever), scarlet fever, septic sore throat, smallpox, syphilis, tetanus, trachoma, trichinosis, tuberculosis, tularemia, typhoid fever, undulant fever, Vincent's angina, whooping cough, yellow fever [Reg , Statutes (1941), secs 381.25, 381 27, 383 06, 384 01, 384 06 (as amended by Laws 1943, ch 21657)]

Georgia.—Actinomycosis anthrax, ascariasis, botulism, chickenpox (varicella) cholera, coccidioidomycosis (coccidioidal granuloma, "valley fever"), common cold, conjunctivitis (acute infectious) of the newborn—not including trachoma, dengue diphtheria dysentery (amebic—amebiasis) dysentery (bacillary), encephalitis (infectious)—lethargic and nonlethargic favus filariasis, food infections and poisonings, German measles (rubella), glanders, gonorrhea, hemorrhagic jaundice (spirochetosis icterohemorrhagic, Weil's disease), hookworm disease (ancylostomiasis), impetigo contagiosa, influenza, leprosy, lymphogranuloma venereum (inguinale) and climatic bubo, malaria, measles (rubeola), meningococcus meningitis (cerebrospinal fever), mumps (infectious parotitis), paratyphoid fever, pediculosis (lousiness), pellagra, plague (bubonic, septicemic, pneumonic) pneumonia (acute lobar), poliomyelitis, psittacosis, puerperal infection (puerperal septicemia), rabies, rat-bite fever (sodoku), relapsing fever, ringworm (dermatophytosis), Rocky Mountain spotted (or tick) fever, scabies (the itch), scarlet fever (scarlatina), schistosomiasis, septic sore throat, smallpox (variola), syphilis, tetanus, trachoma, trichinosis, tuberculosis (pulmonary), tuberculosis (other than pulmonary), tularemia, typhoid fever, typhus fever, undulant fever (brucellosis), Vincent's infection (Vincent's angina, ulcerative or necrotic stomatitis, trench mouth), whooping cough (pertussis), yaws (*frambesia*), yellow fever [Reg , Code Annotated, secs. 88-118, 88-421, 88-501, 88-502]

Chancroid [Code Annotated, secs 88-501, 88-502.]

Occupational disease [Reg.]

Hawaii.—Actinomycosis, anthrax, cerebrospinal meningitis (epidemic, meningococcic), chickenpox (varicella), clonorchiasis (liver-fluke), cholera, conjunctivitis (acute epidemic—pink eye), conjunctivitis (follicular—folliculosis), dengue, diphtheria, dysentery (amebic and bacillary), epidemic (lethargic) encephalitis, erysipelas, German measles, glanders, gonorrhea, gonorrheal ophthalmia (ophthalmia neonatorum), gonorrheal vulvovaginitis, hookworm, impetigo contagiosa, infectious jaundice (Weil's disease), influenza (epidemic), leprosy, malaria, measles, mumps (parotiditis—epidemic), plague (*pestis*), pneumonia (lobar), poliomyelitis (infantile paralysis), psittacosis (parrot fever), scarlet fever (scarlatina), smallpox, streptococcic sore throat (septic sore throat), syphilis, tetanus, trachoma, trichinosis (trichiniasis—pork worm), tuberculosis, tularemia, typhoid fever and paratyphoid fever (enteric fever), typhus fever, undulant fever, whooping cough (pertussis), yellow fever. [Reg., Revised Laws (1935), secs. 1090 (as amended by Laws 1943, Act 48), 1091, 1098, 1104, 1147 (as amended by Laws 1939, Act 164)]

Visible congenital deformities (in newborn). [Reg.]

Idaho.—Actinomycosis, ancylostomiasis (hookworm), anthrax, ascariasis, botulism, chickenpox (varicella), cholera, coccidioidal granuloma, conjunctivitis (acute infectious), conjunctivitis (epidemic—pink eye), dengue, diphtheria, dysentery (amebic—amebiasis), dysentery (bacillary), encephalitis (infectious, lethargic and nonlethargic), erysipelas, favus, filariasis, food infections and poisonings, German measles (rubella), glanders (farcy), gonorrhea, icterohemorrhagic jaundice (Weil's disease), impetigo contagiosa, influenza (upon laboratory confirmation), leprosy, lymphogranuloma venereum (inguinale and climatic bubo), malaria,

measles (rubeola), meningococcus meningitis, mumps (parotitis), paratyphoid fever, pediculosis, pellagra, pink eye, plague (bubonic, septicemic, pneumonic), pneumonia (acute lobar), poliomyelitis, psittacosis, puerperal infection (puerperal septicemia), rabies, rat-bite fever (sodoku), relapsing fever, ringworm, Rocky Mountain spotted (or tick) fever, scabies, scarlet fever (scarlatina), schistosomiasis, septic sore throat (hemolytic streptococcus infection), smallpox (variola), syphilis, tetanus, trachoma, trichinosis, tuberculosis (pulmonary), tuberculosis (other than pulmonary), tularemia, typhoid fever, typhus fever, undulant fever (brucellosis), Vincent's infection (angina, stomatitis, trench mouth), whooping cough, yaws, yellow fever. [Reg.; Code Annotated (1932), secs. 38-307, 38-501, 38-502, 38-701, 38-702.]

Chancroid. [Code Annotated (1932), secs. 38-501, 38-502.]

Illinois.—Actinomycosis, amebiasis (amebic dysentery), ancylostomiasis (hookworm), anthrax, botulism and other forms of food poisoning, chancroid, chickenpox, cholera (Asiatic), dengue, diarrhea in children under 1 year of age (in institutions), diphtheria, dog and other animal bites, dysentery (bacillary and other infective types), encephalitis (*a.* acute, *b.* lethargic), erysipelas, favus, German measles, glanders, gonorrhea, granuloma inguinale, hemolytic streptococcus sore throat, hepatitis (infectious—acute catarrhal jaundice), impetigo contagiosa (in institutions), influenza, jaundice (hemorrhagic—spirochetosis icterohemorrhagica, Weil's disease), keratoconjunctivitis (infectious—superficial punctate keratitis, nummular keratitis), leprosy, lymphocytic choriomeningitis, lymphogranuloma venereum, malaria, measles, meningitis (cerebrospinal fever, meningococcus), meningitis (other—*a.* pneumococcus, *b.* streptococcus, *c.* syphilitic, *d.* tuberculous, *e.* unspecified), mumps, ophthalmia neonatorum (conjunctivitis of the newborn under 14 days of age), ophthalmia in persons over 14 days of age (all infectious types), paratyphoid fever, pellagra, plague, pneumonia (*a.* pneumococcus and other primary forms, *b.* secondary pneumonias complicating infectious diseases), poliomyelitis (acute anterior), psittacosis, rabies, rheumatic fever, Rocky Mountain spotted fever, scarlet fever, streptococcus (septic) sore throat, smallpox, syphilis, tetanus, trachoma, trichiniasis, tuberculosis (pulmonary), tuberculosis (other than pulmonary), tularemia, typhoid fever, undulant fever and Malta fever, typhus fever, Vincent's angina and other infectious anginas, whooping cough, yellow fever. [Reg.; Smith-Hurd Annotated Statutes, ch. 91, secs. 106-107.]

Indiana.—Amebic dysentery, ancylostomiasis (hookworm disease), anthrax, Asiatic cholera, bacillary dysentery, botulism, bubonic plague, cerebrospinal meningitis, chancroid, chickenpox, diphtheria, encephalitis lethargica, erysipelas, German measles, glanders, gonorrhea, impetigo contagiosa, infectious hepatitis (acute catarrhal jaundice), infectious keratoconjunctivitis (superficial punctate keratitis, nummular keratitis), influenza, leprosy, malaria, measles, mumps, ophthalmia neonatorum, pellagra, pneumonia, poliomyelitis, psittacosis, rabies (in humans and animals), Rocky Mountain spotted (or tick) fever, scarlet fever, septic sore throat (streptococcic sore throat), smallpox, syphilis, tetanus, trachoma, tuberculosis (specify form), tularemia, typhoid fever, typhus fever, undulant fever, Vincent's angina (trench mouth), whooping cough, yellow fever. [Reg.; Statutes Annotated (Burns, 1933), secs. 35-402, 35-502, 35-601, 35-903.]

Other statutory citations.—Statutes Annotated (Burns, 1933), secs. 35-115, 35-401.

Iowa.—Actinomycosis, anthrax, ascariasis, botulism, chickenpox (varicella), cholera, coccidioidomycosis (coccidioidal granuloma, "valley fever"), common cold, conjunctivitis (acute infectious) of the newborn—not including trachoma, dengue, diphtheria, dysentery (amebic—amebiasis), dysentery (bacillary), encephalitis (infectious)—lethargic and nonlethargic, favus, filariasis, food infections and poisonings, German measles (rubella), glanders, gonorrhea, hemorrhagic jaundice (spirochetosis icterohemorrhagic, Weil's disease), hepatitis (infectious—acute catarrhal jaundice), hookworm disease (ancylostomiasis), impetigo contagiosa, influenza, keratoconjunctivitis (infectious—superficial punctate keratitis, nummular keratitis), leprosy, lymphogranuloma venereum (inguinale) and climatic bubo, malaria, measles (rubeola), meningococcus meningitis (cerebrospinal fever), mumps (infectious parotitis), paratyphoid fever, pediculosis (lousiness), pellagra, plague (bubonic, septicemic, pneumonic), pneumonia (acute lobar), poliomyelitis, psittacosis, puerperal infection (puerperal septicemia), rabies, rat-bite fever (sodoku), relapsing fever, rheumatic fever (acute), ringworm (dermatophytosis), Rocky Mountain spotted (or tick) fever, scabies (the itch), scarlet fever (scarlatina), schistosomiasis, septic sore throat, smallpox (variola), syphilis, tetanus, trachoma, trichinosis, tuberculosis (pulmonary), tuberculosis (other than pulmonary), tularemia, typhoid fever, typhus fever, undulant fever (brucellosis), Vincent's infection (Vincent's angina, ulcerative or necrotic stomatitis, trench-mouth), whooping cough (pertussis), yaws (frambesia), yellow fever.

Carbon monoxide poisoning; chrome ulceration (nasal and skin); conjunctivitis and retinitis due to electro- and oxy-acetylene welding or other radiant energy; dermatitis (infection or inflammation of the skin on contact surfaces due to oils, cutting compounds or lubricants, dusts, liquids, solids, gases, vapors, or fumes); epithelioma (skin or eye) due to pitch, tar, bitumen, mineral oil, or paraffin, or any compound, product, or residue of any of these substances; metal fume fever (zinc fume fever, brass founder's ague, brass chills); poisoning by benzol or nitro-, hydro-, hydroxy-, and amido- derivatives of benzene (dinitrobenzol, anilin, and others); poisoning by chlorine, ammonia, sulfur dioxide, or any irritating gas, poisoning by cyanide or any of its compounds; poisoning by formaldehyde or its preparations; poisoning by hydrogen sulfide or any other sulfide; poisoning from lead, zinc or brass, cadmium, mercury, arsenic, manganese, or any of their compounds; poisoning from methyl chloride, carbon tetrachloride, or any organic halide or solvent; poisoning by nitrous fumes; poisoning by phosphorus or its compounds; poisoning by sulfuric, hydrochloric, or any other acid; poisoning from volatile petroleum products (gasoline, benzine, naphtha, etc.); poisoning by wood alcohol; radium poisoning or disability due to radioactive properties of substances or Roentgen rays (X-rays); silicatosis; silicosis; tenosynovitis or bursitis. [Reg.; Code (1939), secs. 2247, 2249, 2280, 2281, 2314.]

Chancroid. [Code (1939), secs. 2280, 2281.]

Kansas.—*Group I.*—Actinomycosis, anthrax, chickenpox, cholera (Asiatic—also cholera nostras when Asiatic cholera is present or its importation threatened), continued fever lasting seven (7) days, dengue, diarrhea and enteritis (under 2 years), diphtheria, dysentery (*a.* amebic, *b.* bacillary), epidemic encephalitis, erysipelas, favus, German measles, glanders, hookworm disease, influenza, leprosy, malaria, Malta fever (undulant fever), measles, meningitis (*a.* epidemic cerebrospinal, *b.* tuberculosis), mumps, ophthalmia neonatorum (conjunctivitis of newborn infants), paratyphoid fever, plague, pneumonia (all forms), poliomyelitis (acute infectious), psittacosis, rabies, Rocky Mountain spotted or tick fever, scarlet fever, septic sore throat, smallpox, tetanus, trachoma, trichinosis, tuberculosis (all forms; the organ or part affected in each case to be specified), tularemia, typhoid fever, typhus fever, Vincent's angina, whooping cough, yellow fever.

Group II.—Chancroid, gonorrhea, granuloma inguinale, lymphogranuloma venereum, syphilis, any venereal disease.

Group III.—Food poisoning.

Group IV.—Cancer, pellagra.

Group V.—Arsenic poisoning, bisulfide of carbon poisoning, brass poisoning, caisson disease (compressed-air illness), carbon monoxide poisoning, dinitrobenzene poisoning, lead poisoning, mercury poisoning, naphtha poisoning, natural gas poisoning, phosphorus poisoning, wood alcohol poisoning, any other disease or disability contracted as a result of the nature of the person's employment. [Reg.; General Statutes ([illegible]), secs. 65-105, 65-117, 65-118, 65-[illegible].]

Kentucky.—1. *Disease spread by ordinary contact.*—Chickenpox (varicella), diphtheria, epidemic encephalitis (all types), German measles (rubella), infectious conjunctivitis (pink eye), influenza, leprosy, lymphocytic choriomeningitis, measles (rubeola), meningitis (epidemic or meningococcic), mumps (epidemic parotitis), pneumonia (lobar and broncho), poliomyelitis (infantile paralysis), scabies, scarlet fever, smallpox, trachoma, tuberculosis (all forms), whooping cough (pertussis).

2. *Enteric diseases (spread by water, food, and filth).*—Cholera, dysentery (amebic), dysentery (bacillary), hookworm disease (ancylostomiasis), paratyphoid (A and B), typhoid fever.

3. *Venereal diseases.*—Chancroid, gonorrhea (genitourinary or ophthalmia), granuloma inguinale, lymphogranuloma venereum, syphilis.

4. *Septic infections.*—Erysipelas, impetigo contagiosa, puerperal sepsis, septic sore throat, tetanus, Vincent's angina.

5. *Fungus infections.*—Actinomycosis, blastomycosis, epidermophytosis, favus, sporotrichosis.

6. *Insect-borne diseases.*—Dengue, malaria, plague, relapsing fever, Rocky Mountain spotted fever, typhus fever, yellow fever.

7. *Animal-borne diseases.*—Anthrax, glanders, psittacosis, rabies, rat-bite fever, trichinosis, tularemia, undulant fever.

8. *Deficiency diseases.*—Pellagra.

9. *Occupational diseases*—Acid poisoning (sulfuric, hydrochloric, or hydrofluoric), ammonia poisoning, arsenic poisoning, asbestosis, benzol poisoning (nitro-, hydroxy-, and amido-derivatives of benzene), cadmium poisoning, carbon bisulfide (any sulfide), carbon monoxide poisoning, cataract of glassworkers, chlorine poisoning, chrome ulceration, compressed-air illness, dermatitis (venenata and general), disability from blisters or abrasions, disability from bursitis or synovitis, epitheliomatous cancer or ulcers of skin or eye, (pitch, tar, bitumen, mineral oil, paraffin and their products), formaldehyde poisoning (formaldehyde preparations), hydrocyanic acid poisoning, lead poisoning, manganese poisoning, mercury poisoning, metal fume fever, methyl chloride poisoning (halogenated hydrocarbons), miners' diseases (cellulitis, bursitis, tenosynovitis, nystagmus), nickel carbonyl poisoning, nitrous fume poisoning, petroleum worker's disease (respiratory, gastrointestinal, nerve or eye disorders), phosphorus poisoning, pneumoconiosis, radium poisoning (disability from X-ray or other radioactive substance), silicosis, tetrachlormethane poisoning (similar solvents), wood alcohol poisoning, zinc poisoning. [Reg ; Revised Statutes (Baldwin, 1942), secs. 212.330, 214.150.]

Louisiana.—Amebiasis, anthrax, botulism, cancer, chancroid, chickenpox, cholera, dengue, diphtheria, diseases resulting from occupation, dysentery (bacillary), encephalitis (epidemic), erysipelas, food infections, German measles, glanders, gonorrhea, granuloma inguinale, hookworm, influenza, leprosy, lymph opathia venereum, malaria, measles, meningococcus meningitis, mumps, ophthalmia neonatorum, paratyphoid fever, pellagra, plague, pneumonia (pneumococcic), poliomyelitis, psittacosis, puerperal septicemia, rabies, rabies in animals, rat-bite fever, relapsing fever, Rocky Mountain spotted fever, scarlet fever, septic sore throat, smallpox, syphilis, tetanus, trachoma, trichinosis, tuberculosis (pulmonary), tuberculosis (other forms), tularemia, typhoid fever, typhus fever (endemic), typhus fever (epidemic), undulant fever, Weil's disease, whooping cough, yellow fever [Reg.; General Statutes (Dart), secs. 3434, 3437, 3416, 3417]

Maine.—Actinomycosis, anthrax, botulism, chancroid, chickenpox, cholera (Asiatic), dengue, diphtheria (membranous croup), dysentery (*a* amebic, *b* bacillary), encephalitis (epidemic—lethargic encephalitis), food poisoning, Germam measles, glanders, gonococcus infection (including ophthalmia neonatorum), granuloma inguinale, hookworm disease, influenza (grippe), keratoconjunctivitis (epidemic), leprosy, lymphogranuloma venereum, malaria, meningitis (*a* cerebrospinal, epidemic, *b*, tuberculosis), mumps, paratyphoid fever, pellagra, plague, pneumonia, poliomyelitis (acute infectious—infantile paralysis), psittacosis (parrot fever), rabies, Rocky Mountain spotted fever (tick fever), scarlet fever, septic sore throat (epidemic sore throat), smallpox, syphilis, tetanus, trachoma, trichinosis, tuberculosis (all forms), tularemia, typhoid fever, typhus fever, undulant fever, Vincent's angina, Weil's disease, whooping cough, yellow fever [Reg.; Revised Statutes (1930), ch 19, secs 51, 55, Public Laws (1933), ch. 1, secs. 37 (as amended by Public Laws 1943, ch 358), 97, 125, 185, 310]

Caisson disease. [Public Laws (1931), ch. 164, sec 15.]

Poisoning from lead, phosphorus, arsenic, or mercury, or their compounds, anthrax, compressed-air illness, or any other ailment or disease contracted as result of occupation or employment. [Public Laws (1933), ch. 1, sec. 45]

Lead poisoning (from water) [Public Laws (1933), ch. 1, sec. 46]

Other statutory citations.—Public Laws (1933), chapter 1, sections 94 (III), 100 [as amended by Public Laws (1935), ch. 84, sec. 8].

Maryland.—Anthrax, botulism, chancroid, chickenpox, cholera (Asiatic), diphtheria, dysentery (amebic and bacillary), encephalitis (epidemic), German measles, gonorrhea, influenza, leprosy, malaria, measles, meningococcus meningitis, mumps, ophthalmia neonatorum, paratyphoid fever, pellagra, plague, pneumonia (all forms), poliomyelitis, psittacosis, rabies, rheumatic fever, rheumatic heart disease, Rocky Mountain spotted fever, scarlet fever, septic sore throat, smallpox, syphilis, tetanus, trachoma, trichinosis, tuberculosis, tularemia, typhoid fever, typhus fever, undulant fever, whooping cough, other communicable diseases during an epidemic, all occupational or industrial diseases. [Reg.; Annotated Code (Flack, 1939), art. 27, sec 322; art. 43, secs 76, 77, 89, 97]

Poisoning from lead, phosphorus, arsenic, or mercury, or their compounds, anthrax, compressed-air illness, or any other ailment or disease contracted as result of nature of employment. [Annotated Code (Flack, 1939), art. 48, sec 11]

Membranous croup. [Annotated Code (Flack, 1939), art. 43, sec. 76.]

Yellow fever [Annotated Code (Flack, 1939), art. 43, secs. 77, 97.]

Fever in lying-in woman., [Annotated Code (Flack, 1939), art. 43, sec. 81.]

Massachusetts.—Actinomycosis, anterior poliomyelitis (*a* paralytic, *b*. nonparalytic (preparalytic)), anthrax, Asiatic cholera, chickenpox, cholecystitis of typhoid origin, diphtheria, dog bite, dysentery (*a*. amebic, *b*. bacillary), encephalitis (infectious), German measles, glanders, gonorrhea, hookworm disease, infectious diseases of the eye (*a*. ophthalmia neonatorum, *b* suppurative conjunctivitis, *c*. trachoma), leprosy, lymphocytic choriomeningitis, malaria, measles, meningitis (*a*. meningococcal, *b*. other: Pfeiffer bacillus, pneumococcal, streptococcal, etc.), mumps, paratyphoid fever and all other Salmonella infections, plague, pneumonia (lobar), psittacosis, rabies, Rocky Mountain spotted fever, scarlet fever, septic sore throat, smallpox, syphilis, tetanus, trichinosis, tuberculosis (all forms), tularemia, typhoid fever, typhus fever, undulant fever, Weil's disease (leptospira icterohemorrhagiae), whooping cough, yellow fever. [Reg.; Annotated Laws, ch. 111, secs. 109–111.]

Illness (group of cases) believed due to food. [Reg.]

Other statutory citations.—Annotated Laws, chapter 149, section 11.

Michigan.—Actinomycosis, ancylostomiasis (hookworm), anthrax, blastomycosis, botulism, chancroid, chickenpox, cholera, dengue, diarrhea of newborn (only in infants under 1 month of age), diphtheria, dog bites, dysentery (amebic), dysentery (bacillary—by type of organism when known—mucous or bloody diarrhea), encephalitis (acute infectious—encephalitis lethargica), epidemic keratoconjunctivitis, erysipelas, favus, glanders, gonorrhea, granuloma inguinale, impetigo, infectious jaundice (Weil's disease), influenza, influenzal meningitis, leprosy, lymphogranuloma venereum, malaria, measles, meningococcic meningitis, mumps, occupational diseases, ophthalmia neonatorum (gonorrheal), paratyphoid A, paratyphoid B, pediculosis, pertussis (whooping cough), pink eye, plague, pneumonia (lobar, broncho, unspecified—by type of organism when known), poliomyelitis, psittacosis, puerperal streptococcic infections, rabies (both human and animal), rheumatic fever (acute), ringworm, Rocky Mountain spotted fever, rubella (German measles), scabies, scarlet fever, smallpox, streptococcic sore throat (acute), syphilis, tetanus, trachoma, trichinosis, tuberculosis, tularemia, typhoid, typhus, undulant fever, Vincent's infection (acute—trench mouth), yellow fever. [Reg.; Statutes Annotated, secs. 14.103, 14.104, 14.342, 14.345 (1), 14.345 (2), 14.361, 17.431, 28.740.]

Other statutory citations.—Statutes Annotated, sections 12.374, 17.32.

Minnesota.—Actinomycosis, anterior poliomyelitis, anthrax, Asiatic cholera, botulism, cerebrospinal meningitis, chancroid, chickenpox, dengue, diphtheria, dysentery (*a*. amebic, *b* bacillary), epidemic encephalitis (encephalitis lethargica), epidemic jaundice, epidemic or septic sore throat, erysipelas, favus, glanders, gonorrhea, hookworm disease, influenza (and pneumonia following), leprosy, malaria, measles (and pneumonia following), ophthalmia neonatorum, paragonimiasis, paratyphoid fever, pellagra, plague, pneumonia, psittacosis, rabies (human cases and exposed persons), Rocky Mountain spotted or tick fever, scarlet fever (scarlatina, scarlet rash), smallpox, syphilis, tetanus (including tetanus neonatorum), trachoma, trichinosis, tuberculosis, tularemia, typhoid fever, typhus fever, undulant fever (Malta fever), Vincent's angina, whooping cough, yellow fever [Reg.; Statutes (1941), sec. 144.42.]

Poisoning from lead, phosphorus, arsenic, brass, silica dust, carbon monoxide gas, wood alcohol, mercury, or their compounds, anthrax, compressed-air illness. or any other disease contracted as result of nature of employment. [Statutes (1941), secs. 144.34, 175.33.]

Defect, injury, or disease of a continuous nature or which might permanently handicap (in child, not under 1, of preschool age or of school age but not attending school) [Statutes (1941), sec. 144.33.]

Other statutory citations.—Statutes (1941), sections 35 06, 252.13.

Mississippi.—Cancer, chickenpox, dengue, diphtheria, dysentery (*a* amebic, *b*. bacillary), gonorrhea, granuloma inguinale, hookworm, influenza, leprosy, lymphogranuloma inguinale, malaria, measles, meningitis (*a*. meningococcus, *b* other forms), mumps, ophthalmia neonatorum, pellagra, plague (bubonic), pneumonia (*a*. lobar, *b*. broncho), poliomyelitis (acute), puerperal septicemia, Rocky Mountain spotted fever, scarlet fever, smallpox, syphilis, trachoma, tuberculosis (*a* pulmonary, *b*. other forms), tularemia, typhoid fever, typhus fever, undulant fever, whooping cough, yellow fever. [Reg.; Code Annotated (1930), secs. 4883, 4884, 4911, 4912, 4918.]

Cholera. [Code Annotated (1930), sections 4883, 4884.]

Rabies in animals. [Reg]

Missouri.—*Division A.*—Diseases communicable and dangerous to public health: Actinomycosis, acute infectious conjunctivitis, ancylostomiasis, anthrax, chickenpox, cholera, dengue, diphtheria, dysentery (amebic), dysentery (bacillary), encephalitis lethargica (epidemic), favus, German measles, glanders, influenza (epidemic), leprosy, malaria, measles, meningococcus meningitis, mumps, paratyphoid fever, plague, pneumonia, poliomyelitis (acute anterior), psittacosis, puerperal infection, rabies, Rocky Mountain spotted fever (tick fever), scarlet fever, septic sore throat, smallpox, tetanus, trachoma, trichinosis, tuberculosis (pulmonary), tuberculosis (other than pulmonary), tularemia, typhoid fever, typhus fever, undulant fever, whooping cough, yellow fever

Division B.—Diseases communicable and dangerous to public health: Chancroid, gonorrhea, syphilis.

Division C.—Diseases dangerous to public health Beriberi, botulism (food poisoning), pellagra, scurvy.

Division D.—Diseases dangerous to public health Aniline poisoning, arsenic poisoning, benzine poisoning, benzol poisoning, bisulfide of carbon poisoning, brass poisoning, carbon monoxide poisoning, compressed-air illness, dinitrobenzene poisoning, lead poisoning, naphtha poisoning, natural gas poisoning, phosphorus poisoning, turpentine poisoning, tetraethyl lead poisoning, wood alcohol poisoning. [Reg.; Revised Statutes (1939), sec. 9995.]

Any disease or illness due or incident to any process, or manufacture, or labor in which antimony, arsenic, brass, copper, lead, mercury, phosphorus, zinc, their alloys or salts or any poisonous chemicals, minerals, acids, fumes, vapors, gases, or other substances are generated or used, employed or handled in harmful quantities or under harmful conditions or contacted in a harmful way. [Revised Statutes (1939), secs. 10212, 10214, 10215]

Diseases in animals transmissible to man: Actinomycosis, anthrax, foot-and-mouth disease, glanders, rabies, tuberculosis. [Reg.]

Montana.—Actinomycosis, anthrax, botulism, cancer, chancroid, chickenpox, cholera, diphtheria (or membranous croup, so-called), dysentery (*a*. amebic, *b*. bacillary), erysipelas, favus, food poisoning, German measles, glanders, gonorrhea, influenza (epidemic), leprosy, malaria, measles, meningitis (*a*. meningococcic, *b*. tuberculous), mumps, ophthalmia neonatorum (conjunctivitis of newborn infants), paratyphoid fever, pellagra, plague, pneumonia (acute lobar), poliomyelitis (acute infectious, or infantile paralysis), psittacosis, rabies. Rocky Mountain "spotted" or "tick" fever, scarlet fever, septic sore throat, smallpox, syphilis, tetanus, tick paralysis, trachoma, trichinosis, tuberculosis (all forms, including "miner's consumption"), tularemia, typhoid fever (enteric fever), typhus fever, undulant fever, whooping cough, yellow fever. [Reg.; Revised Codes (1935), secs. 2457, 2478, 2479, 2564, 2565.]

Occupational disease. [Revised Codes (1935), sec. 2577.7.] [1]

[1] The wording of this law is: "* * * every physician, hospital, or clinic superintendent, and the State coal and quartz mine inspectors having knowledge of a case of occupational disease shall, upon request of the secretary of the division of industrial hygiene of the State of Montana, and within 10 days after such request, report the same to the division of industrial hygiene."

Nebraska.—*List A.*—Diseases communicable and dangerous to public health: Actinomycosis, anthrax, chickenpox (varicella), diphtheria, dysentery (bacillary), dysentery (amebic), encephalitis (infectious), erysipelas, glanders, influenza, jaundice (Weil's disease), leprosy, malaria, measles, meningococcus meningitis, mumps, ophthalmia neonatorum, paratyphoid fever, plague, pneumonia (acute), poliomyelitis (acute), rabies (human), Rocky Mountain spotted fever, scarlet fever, septic sore throat, smallpox (variola), tetanus, trachoma, trichinosis, tuberculosis, tularemia, typhoid fever, undulant fever, whooping cough (pertussis).

List B.—Diseases communicable and dangerous to public health: Chancroid, gonorrhea, syphilis.

List C.—Diseases dangerous to public health (not communicable): Botulism, mass food poisoning. [Reg.; Compiled Statutes (1929), sec. 71-2502.]

Asiatic cholera, typhus fever, yellow fever. [Compiled Statutes (1929), sec. 71-2502.]

Communicable diseases in animals transmissible to man. Actinomycosis, Bang's disease, foot-and-mouth disease, glanders, rabies, tuberculosis. [Reg.]
Impetigo contagiosa, pediculosis, rubella. [Reg.]
Other statutory citations.—Compiled Statutes (1929), section 79-2118.

Nevada.—Actinomycosis, anthrax, botulism, cancer, chancroid, chickenpox, coccidioidal granuloma, conjunctivitis (acute infectious), dengue, diarrhea in children, diphtheria, dysentery (amebic), dysentery (bacillary), encephalitis (epidemic), erysipelas, food infections and poisonings, German measles, glanders, gonorrhea, granuloma venereum, influenza (epidemic), jaundice (epidemic), leprosy, lymphogranuloma venereum, malaria, measles, meningococcus meningitis, mumps, paratyphoid fever, pellagra, plague, pneumonia (designate form and type), poliomyelitis (anterior), psittacosis, puerperal infection, rabies, relapsing fever, Rocky Mountain spotted fever, scarlet fever, septic sore throat, smallpox, syphilis, tetanus, trachoma, trichinosis, tuberculosis (pulmonary), tuberculosis (other than pulmonary), tularemia, typhoid fever, typhus fever, undulant fever, Vincent's infection, whooping cough, yaws. [Reg.; Compiled Laws (1929), secs. 5251, 5290, 5291; 1931-1941 Supplement to 1929 Compiled Laws, secs. 5317.11, 5317.15.]
Bronchitis. [Compiled Laws (1929), sec. 5251].
Other statutory citations.—Compiled Laws (1929), section 5266; Laws (1943), chapter 116, section 6.

New Hampshire.—Anthrax, botulism, cancer, chancroid, chickenpox, cholera (Asiatic), dog bite, diphtheria, dysentery (amebic and bacillary), encephalitis (infectious—lethargic and nonlethargic), epidemic or streptococcus (septic) sore throat, food poisoning (multiple cases), German measles, glanders, gonorrhea, granuloma inguinale, leprosy, lymphopathia venereum, malaria, measles, meningococcus meningitis, mumps, ophthalmia neonatorum (suppurative conjunctivitis of the newborn), paratyphoid fever, plague, pneumonia (all forms), poliomyelitis (infantile paralysis), psittacosis, rabies, Rocky Mountain spotted fever, scarlet fever, smallpox, syphilis, tetanus, trachoma, trichinosis, tuberculosis, tularemia, typhoid fever, typhus, undulant fever, Vincent's angina, whooping cough, yellow fever. [Reg.; Revised Laws (1942), ch. 147, sec. 16; ch. 150, sec. 8; ch. 151, sec. 1, ch. 156, sec 7; ch. 159, sec. 9; ch. 328, secs. 18, 19.]
Poison from lead, phosphorus, arsenic, brass, wood alcohol, mercury, or their compounds, anthrax, compressed-air illness, or any other ailment or disease contracted as result of nature of employment. [Revised Laws (1942), ch. 155, sec. 1.]
Impairment of hearing (evidenced by child under 16 for 6 months or more). [Revised Laws (1942), ch 150, sec. 16.]
Other statutory citations.—Revised Laws (1942), chapter 156, section 9

New Jersey.—Anthrax, chickenpox, cholera (Asiatic), diarrhea (infectious) of the newborn, diphtheria (membranous croup), dysentery (amebic and bacillary), encephalitis (lethargic), glanders, influenza, leprosy, malaria, measles, measles (German—rubella), meningitis (epidemic cerebrospinal), mumps, ophthalmia neonatorum, paratyphoid fever, plague, pneumonia (broncho, lobar), poliomyelitis (acute anterior—infantile paralysis), rabies (hydrophobia), Rocky Mountain spotted fever, scarlet fever, smallpox (varioloid), streptococcic sore throat, tetanus, trachoma, trichinosis, tuberculosis (all forms), tularemia, typhoid fever, typhus fever (Brill's disease), undulant fever, whooping cough, yellow fever. [Reg.; Statutes Annotated, secs. 26:4-15, 26:4-16, 26:4-17, 26:4-19, 26:4-73, 40:21-45, 18:14-64.8.]
Chancroid, gonorrhea, syphilis. [Statutes Annotated, secs 26:4-27, 26:4-38, 26:4-39.]
Rabies (actual or suspected) in a dog, cat, or other animal [Statutes Annotated, sec. 26:4-78.]
Dog, cat, or other animal bitten by known or suspected rabid animal. [Statutes Annotated, sec. 26:4-78.]
Bite by a dog, cat, or other animal. [Statutes Annotated, secs. 26:4-79, 26:4-80, 26:4-81.]
Mental deficiency or epilepsy. [Statutes Annotated, sec 26:5-1.]
Defective vision which may result in permanent blindness [Statutes Annotated, sec. 30:6-1.]
Lead poisoning. [Statutes Annotated, secs. 34.6-49, 34:6 53, 34:6-54.]
Other statutory citations.—Statutes Annotated, sections 24.10-15 (par. 5), 34:6-127, 34:6-136.7 (par. g), 34:6-136.10 (par. f), 45:7-29.

New Mexico.—*Group I.*—Actinomycosis, anthrax, chancroid, chickenpox, cholera (Asiatic), conjunctivitis (acute infectious), dengue, diphtheria, dysentery (amebic), dysentery (bacillary), encephalitis lethargica, favus, filariasis, German measles, glanders, gonococcus infection, hookworm disease, influenza, leprosy, malaria, measles, meningitis (epidemic cerebrospinal), mumps, paratyphoid fever, plague, pneumonia (lobar), pneumonia (broncho), poliomyelitis (acute infectious), psittacosis, rabies (human), rabies (animal), relapsing fever, Rocky Mountain spotted (or tick) fever, scarlet fever, septic sore throat, smallpox, syphilis (all stages), tetanus, trichinosis, trachoma, tuberculosis (the organ or part affected in each case to be specified), tularemia, typhoid fever, typhus fever, undulant fever, whooping cough, yellow fever.
Group II.—Anthrax, arsenic poisoning; asbestosis; bisulfide of carbon poisoning; brass or zinc poisoning; caisson disease (compressed-air illness); carbon monoxide poisoning; carbon dioxide poisoning; chronic ulceration; dinitrobenzene poisoning; glanders; hydrogen sulfide poisoning; infection or inflammation of the skin on contact surfaces due to oils, cutting compounds, or lubricants, dust, liquids, fumes, gases or vapors; lead poisoning; manganese dioxide poisoning; mercury poisoning; naphtha poisoning; natural gas poisoning; phosphorus poisoning; poisoning by benzol or by nitro- and amido- derivatives of benzol (dinitrobenzol, anilin, and others); poisoning by gasoline, benzine, or other volatile products; poisoning by petroleum and its compounds and derivatives; potassium cyanide poisoning; radium poisoning; silicosis; sulfur dioxide poisoning; tenosynovitis and prepatellar bursitis; wood alcohol poisoning; any other disease, disability or injury contracted as a result of the nature of the person's employment.
Group III.—Beriberi, drug addictions or habits, cancer, food poisoning, continued fever lasting 7 days, heat prostration, pellagra, puerperal septicemia. [Reg.; Statutes 1941 Annotated, secs. 71-301 (par. 5), 71-308, 71-323.]
Venereal diseases (other than syphilis, gonorrhea, chancroid). [Statutes 1941 Annotated, sec 71-323.]
Other statutory citations.—Statutes 1941 Annotated, section 51-305.

New York.—Anthrax, botulism, chancroid, chickenpox, cholera (Asiatic), diphtheria, dysentery (amebic and bacillary), encephalitis (lethargic and other infectious), epidemic or streptococcus (septic) sore throat, glanders, gonorrhea, malaria, measles, meningococcus meningitis or meningococcemia (septicemia), ophthalmia neonatorum (suppurative conjunctivitis occurring in infants 21 days of age or less), paratyphoid fever, plague, pneumonia (all forms), poliomyelitis, psittacosis, rabies, Rocky Mountain spotted fever, scarlet fever, smallpox, syphilis, tetanus, trichinosis, tuberculosis, tularemia, typhoid fever, typhus fever, undulant fever, whooping cough.
Bites by animals having or suspected of having rabies; bites by animals of a species subject to rabies [reportable in a health district certified by State commissioner of health as one in which rabies exists among dogs]; illness (group of cases) believed due to consumption of spoiled or poisonous food. [Reg.]
Total deafness or impaired hearing in any minor under 6 years. [Consolidated Laws (McKinney), Public Health Law, sec. 330-a.]
Cancer or other malignant tumor. [Consolidated Laws (McKinney), Public Health Law, sec. 25-b.]

Poisoning by lead, phosphorus, arsenic, brass, wood alcohol, mercury, or other compounds, anthrax, or compressed-air illness, contracted as result of nature of employment [Consolidated Laws (McKinney), Labor Law, sec 206.]
Other statutory citations.—Consolidated Laws (McKinney), Public Health Law, sections 25, 314.

North Carolina.—Anthrax, chancroid, chickenpox, cholera (Asiatic), diphtheria, dysentery (bacillary), endemic typhus, German measles, gonorrhea, infantile paralysis, influenza, malaria, measles, meningococcus meningitis, ophthalmia neonatorum, paratyphoid fever, pellagra, plague, psittacosis, rabies, Rocky Mountain spotted fever, scarlet fever, septic sore throat, smallpox, syphilis, trachoma, tuberculosis, tularemia, typhoid fever, typhus fever, undulant fever, Vincent's infection, whooping cough, yellow fever. [Reg; Code (1939), secs 7151, 7152, 7176, 7180, 7181, 7191, 7192, 7216, 7217, 7220 (b), 7220 (c)]
Bite by dog or animal having or suspected of having rabies. [Reg , 1941 Supplement to 1939 Code, sec. 4895 (17)]

North Dakota —Actinomycosis, ancylostomiasis (hookworm disease) anthrax, chancroid, chickenpox (varicella), cholera, conjunctivitis (acute infectious), dengue, diarrhea of the newborn (in institutions), diphtheria, dysentery (amebic–amebiasis), encephalitis (infectious—lethargic and nonlethargic), erysipelas, favus, German measles (rubella), glanders (farcy) gonorrhea, impetigo contagiosa (without medical attention), influenza, leprosy, lymphogranuloma venereum (inguinale, climatic bubo), malaria, measles (rubeola), meningococcus meningitis, mumps (parotitis), paratyphoid fever, plague (bubonic, septicemic, pneumonic), pneumonia (acute lobar, broncho and unspecified), poliomyelitis, psittacosis, puerperal infection (puerperal septicemia), rabies, rat bite fever (sodoku), relapsing fever, Rocky Mountain spotted (or tick) fever, scarlet fever (scarlatina), septic sore throat (streptococcus throat infection), smallpox (variola), syphilis, tetanus, trachoma, tuberculosis (pulmonary), tuberculosis (other than pulmonary), tularemia, typhoid fever, undulant fever (brucellosis), Vincent's infection, whooping cough, yellow fever [Reg Compiled Laws (1913), secs 421, 3170, 3825 1913 1925 Supplement to 1913 Compiled Laws, secs 2971b1, 2971b2]
Ascariasis, coccidioidomycosis (coccidioidal granuloma, "valley fever"), hemorrhagic jaundice (spirochetosis icterohemorrhagic, Weil's disease) scabies (the itch), trichinosis [Reg]
Botulism, food infections and poisonings, pellagra [Reg]
Person or animal bitten by dog or other animal infected or suspected of being infected with rabies [Reg]
Other statutory citations —Compiled Laws (1913), section 423, Laws (1931), chapter 299, section 7

Ohio —*Class A* —Actinomycosis anthrax botulism, chickenpox (varicella), chancroid, cholera, dengue, diphtheria, dysentery (amebic—amebiasis), dysentery (bacillary), encephalitis infectious (lethargic and nonlethargic), epidemic diarrhea of the newborn, erysipelas, favus, food infections and poisonings, foot-and-mouth disease (in man), German measles (rubella), glanders, gonorrhea, gonorrheal ophthalmia, hookworm disease (ancylostomiasis), inflammation of eyes of newborn (ophthalmia neonatorum), influenza, leprosy, lymphogranuloma venereum (granuloma inguinale, and climatic bubo), malaria, measles (rubeola), meningococcus meningitis (cerebrospinal fever), milk sickness, mumps (infectious parotitis), paratyphoid fever, pellagra, plague (bubonic, septicemic, pneumonic), pneumonia (acute lobar), poliomyelitis, psittacosis, puerperal infection (puerperal septicemia), rabies (in man), Rocky Mountain spotted (or tick) fever, scarlet fever (scarlatina), septic sore throat, smallpox (variola), syphilis, tetanus, trachoma, trichinosis, tuberculosis (pulmonary), tuberculosis (other than pulmonary), tularemia, typhoid fever, typhus fever, undulant fever (brucellosis) whooping cough (pertussis), yaws (frambesia), yellow fever
Class B —Aniline poisoning, arsenic poisoning, benzine (gasoline) poisoning, benzol poisoning, brass poisoning, carbon monoxide poisoning, compressed-air illness, dinitrobenzene poisoning, lead poisoning, mercury poisoning, naphtha poisoning, natural gas poisoning, phosphorus poisoning, turpentine poisoning, wood alcohol poisoning
Class C[1]—Ascariasis, coccidioidomycosis, common cold, filariasis, hemorrhagic jaundice (spirochetosis icterohemorrhagic, Weil's disease), impetigo contagiosa, pediculosis (lousiness), rat bite fever (sodoku), relapsing fever, ringworm (dermatophytosis), scabies (the itch), schistosomiasis, Vincent's infection (Vincent's angina, ulcerative or necrotic stomatitis, trench mouth) [Reg , Throckmorton's Code Annotated (Baldwin's 1940 Certified Revision), secs 1243, 1243–1, 4427, 4460, 6330–2, 6330–6, 6330–7, Baldwin's Code Service (January 1942 Number), secs 1248–1, 1248–2]
Bite or injury by dog, cat, or other animal [Reg]

[1] Reportable only when occurring in unusual prevalence in a health district

Oklahoma —Anterior poliomyelitis (infantile paralysis), chickenpox, diphtheria (including membranous croup), epidemic cerebrospinal meningitis, epidemic influenza, leprosy, measles, mumps, ophthalmia neonatorum, scarlet fever (including scarlatina and scarlet rash), smallpox, tuberculosis (acute pulmonary), typhoid fever, venereal diseases (in known prostitutes refusing treatment), whooping cough [Reg , Statutes (1941), title 63, secs 71–72]
Anthrax in man, chancroid, chickenpox (varicella), cholera, conjunctivitis (acute infectious of the new born), dengue, diphtheria, dysentery (amebic), dysentery (bacillary), encephalitis (infectious), German measles (rubella), gonorrhea, granuloma inguinale, hookworm disease (ancylostomiasis), influenza, lymphogranuloma venereum, malaria, measles (rubeola), meningococcus meningitis, mumps (infectious parotitis), paratyphoid fever, pellagra, plague (bubonic, septicemic, pneumonic), pneumonia (give type), poliomyelitis, psittacosis, puerperal infection (puerperal septicemia), rabies in man, Rocky Mountain spotted fever, scarlet fever (scarlatina), septic sore throat, smallpox (variola), syphilis, tetanus, trachoma, tuberculosis (pulmonary), tuberculosis (other than pulmonary), tularemia, typhoid fever, typhus fever (epidemic or louse-borne), typhus fever (endemic or flea-borne), undulant fever (brucellosis), whooping cough (pertussis), yellow fever [The diseases listed in this paragraph are the ones specified on the Oklahoma report card as being the reportable diseases in that State]
Other statutory citations —Statutes (1941), title 63, sections 12, 13, 541, 542

Oregon.—Amebiasis, ancylostomiasis (hookworm disease), anthrax, ascariasis, botulism, chancroid, chickenpox, cholera, coccidioidal granuloma, conjunctivitis (acute infectious), dengue, diphtheria, dysentery (amebic), dysentery (bacillary), encephalitis infection (lethargic and nonlethargic), erysipelas, favus, filariasis, food poisoning, German measles (rubella), glanders, gonorrhea, impetigo contagiosa, influenza, interhemorrhagic [sic] jaundice, leprosy, lymphogranuloma inguinale, malaria, measles, meningococcus meningitis, mumps, paratyphoid, pediculosis, plague (bubonic, septicemic, pneumonic), pneumonia (acute, lobar), poliomyelitis, psittacosis, puerperal infection (puerperal septicemia), rabies, rat-bite fever, relapsing fever, ringworm, Rocky Mountain spotted fever, scabies, scarlet fever, schistosomiasis, septic sore throat, smallpox, syphilis, tetanus, trachoma, trichinosis, tuberculosis (pulmonary), tuberculosis (other than pulmonary), tularemia, typhoid, typhus fever, undulant fever (brucella infection), Vincent's infection, whooping cough, yaws, yellow fever [Reg , Compiled Laws Annotated, secs. 99-801, 99-705, 99-706, 99-707, 99-801]
Other statutory citations —Compiled Laws Annotated, sections 99-801, 99-518.

[illegible].—Acute anterior poliomyelitis (infantile paralysis), anthrax, [illegible], plague, chickenpox, diphtheria (diphtheritic croup, membranous croup, putrid sore throat), encephalitis lethargica, epidemic cerebrospinal meningitis (cerebrospinal fever, spotted fever), epidemic dysentery (bacillary or amebic dysentery), German measles, glanders (farcy), leprosy, malaria, Malta (undulant) fever, measles, mumps, ophthalmia neonatorum, paratyphoid fever, pellagra, psittacosis, rabies (hydrophobia), relapsing fever, Rocky Mountain spotted fever, scarlet fever (scarlatina, scarlet rash), smallpox (variola, varioloid), trachoma, trichiniasis, tuberculosis in any form, tularemia, typhoid fever, typhus fever, whooping cough, yellow fever. [Reg., Statutes Annotated (Purdon), title 35, secs 511, 512, 514, title [illegible], sec. [illegible].]

Cancer, diabetes, pneumonia, syphilis. [Reg]

Anthracosis, arsenic poisoning, bisulfide of carbon poisoning, brass poisoning, caisson disease (compressed-air illness), carbon monoxide poisoning, dinitrobenzene poisoning, lead poisoning, mercury poisoning, naphtha poisoning, natural gas poisoning, phosphorus poisoning, wood alcohol poisoning [Reg.; Statutes Annotated (Purdon), title 43, secs 473, 477, 478.]

Total deafness or impaired hearing in any minor under 6 [Statutes Annotated (Purdon), title 24, sec. 2611.]

Other statutory citations —Statutes Annotated (Purdon), title 35, section 511

Puerto Rico.—Acute anterior poliomyelitis (infantile paralysis), acute epidemic conjunctivitis, alimentary infections (caused by taking foods contaminated with bacilli of the salmonicidus [Salmonella] group, bacilli botulinus, staphylococci, etc), Asiatic cholera, diphtheria, dysentery (amebic or bacillary), epidemic cerebrospinal meningitis, exanthematous typhus, glanders, influenza, malignant anthrax (malignant pustule), measles, paratyphoid fever, plague (bubonic, pneumonic, or septicemic forms), pneumonia (in all its forms), scarlet fever, smallpox, streptococcus angina (epidemic), typhoid fever, yellow fever

Chancroid, dengue, epidemic parotitis, filariasis gonorrhea, leprosy, lethargic encephalitis (epidemic), malaria, Malta fever, ophthalmia neonatorum, psittacosis, puerperal fever, rabies, rubeola (epidemic roseola), syphilis (cutaneous) tetanus (including tetanus infantum), tropical frambesia (buboes), tuberculosis, tularemia, varicella, Vincent s angina whooping cough [Reg., Acts 1912, No 81, sec 28 (as amended by Acts 1935, No 47, sec 3) Acts 1919, No 76 secs 9, 10, 11]

Rhode Island.—Actinomycosis, anterior poliomyelitis, anthrax, botulism, carcinoma, chancroid, cholera, diphtheria, dysentery (amebic and bacillary), encephalitis (epidemic), glanders, gonorrhea, influenza, leprosy, leukemia, lymphogranuloma (venereum), lymphoma, malaria, measles, membranous croup, meningitis (tuberculous and cerebrospinal), mumps, ophthalmia, paratyphoid fever, pellagra, plague (bubonic and oriental), pneumonia (lobar), psittacosis, rabies (also dog bite), rheumatic fever, Rocky Mountain spotted fever, sarcoma, scarlet fever, septic sore throat, smallpox, syphilis, tetanus, trachoma, trichinosis, tuberculosis (except primary), tularemia, typhoid fever, typhus fever, undulant fever, Vincent's angina, whooping cough, yellow fever [Reg , General Laws (1938), ch 255, secs 9 (as amended by Laws 1939, ch 713), 10 (as amended by Laws 1939, ch 713), 15 (as amended by Laws 1941, ch 1014), ch 256, secs 12 (as amended by Laws 1942, ch 1159), 19, 35 ch 257, secs 1, 6, 7 ch 606, sec 24]

Cancer, other malignant growths [General Laws (1938) ch 255, sec 15 (as amended by Laws 1941, ch 1014)]

Poisoning from lead, phosphorus, arsenic, brass, wood alcohol, mercury, or their compounds, anthrax, compressed-air illness, or any other ailment or disease contracted as a result of the nature of the employment. [General Laws (1938), ch 255, sec. 18]

Deafness or indications of being or becoming hard of hearing in child between 4 and 16 [General Laws (1938), ch 255, sec 23 (as added by Laws 1943, ch 1305)]

Other statutory citations —General Laws (1938), chapter 293, section 3 (par e).

South Carolina.—Actinomycosis, acute poliomyelitis, Asiatic cholera, chickenpox, chancroid, dengue, diphtheria, dysentery (amebic and bacillary), encephalitis lethargica, favus, German measles, glanders, gonorrhea, hookworm, influenza, leprosy, malaria, measles, meningitis (meningococcus and tubercular), mumps, ophthalmia neonatorum, pellagra, plague, pneumonia (lobar and bronchial), rabies, Rocky Mountain spotted fever, scarlet fever, septic sore throat, smallpox, syphilis, tetanus, trachoma, trichinosis, tuberculosis (all forms), tularemia, typhoid fever, typhus fever (endemic), typhus fever (epidemic), undulant fever, whooping cough, yellow fever

Anthrax, asbestosis, cataract (glassworkers), compress[ed]-air illness, dermatitis due to irritating oil, cutting compounds or lubricants, chemical dust, liquids, dyes, fumes, gases, or vapors; carbon monoxide poisoning; carbon tetrachloride and phosgene poisoning chlorine poisoning, lead poisoning, mercury poisoning, poisoning by benzol, or nitro- and amido- derivatives of benzol dinitrobenzol, anilin, and others), poisoning by carbon bisulfide, methanol, or volatile halogenated hydrocarbons, poisoning by gasoline, benzine, naphtha, or other volatile petroleum products, poisoning by hydrogen fluoride or nitrous gases, poisoning by refrigerants (methyl chloride, ethyl chloride, dichlorethylene methyl bromide ethyl bromide, methylene chloride, methyl formate dichlorodifluoromethane, dichloroethane, monofluoromethane, sulfur dioxide), poisoning by sulfuric, hydrochloric, or hydrofluoric acid, silicatosis, silicosis [Reg., Code of Laws (1942), secs 5028, 5043, 5044, 5044–1]

Any contagious disease, any occupational disease, granuloma inguinale, lymphogranuloma venereum. [Reg]

Other statutory citations —Code of Laws (1942), sections 5018, 5020, 5081

South Dakota.—Actinomycosis, acute anterior poliomyelitis, anthrax, Asiatic cholera, cerebrospinal meningitis, chancroid, chickenpox, diphtheria, erysipelas, glanders, gonorrhea, hookworm disease, influenza, leprosy, malarial fever, measles, ophthalmia neonatorum, pellagra, plague, pneumonia, puerperal fever, rabies, Rocky Mountain spotted fever, scarlet fever, septic sore throat, smallpox, syphilis, tetanus, trachoma, trichiniasis, tuberculosis, tularemia, typhoid fever, typhus fever, undulant fever, whooping cough, yellow fever [Reg , Code (1939), secs 27 2007, 27 2302 27 2401, 27 2402]

Tennessee.—*Class I* —Anthrax, chickenpox, cholera (Asiatic), dengue, diphtheria dysentery (bacillary), encephalitis (type A), encephalitis (type B, St Louis type), encephalitis (equine), glanders, leprosy, lymphocytic choriomeningitis, meningitis (meningococcus), ophthalmia neonatorum, paratyphoid fever, plague, poliomyelitis, psittacosis, rabies in humans, rat-bite fever, Rocky Mountain spotted fever, scarlet fever, septic sore throat, smallpox, tularemia, typhoid fever, typhus fever, undulant fever, yellow fever.

Class II.—Chancroid, gonorrhea, granuloma inguinale, lymphogranuloma venereum, syphilis

Class III.—Actinomycosis, amebiasis, erysipelas, German measles, hookworm disease, influenza, malaria —[illegible] type, measles, mumps, pneumonia, puerperal septicemia, tetanus, trachoma, trichinosis, tuberculosis (excluding childhood type), Vincent's angina, whooping cough

Class IV.—(Noncommunicable) Botulism, pellagra. [Reg.; Code Annotated (Williams), secs [illegible].]

Illness (group of cases) believed due to food [Reg.]

Epidemic keratoconjunctivitis. [Reg.]

Venereal diseases (other than syphilis, gonorrhea, chancroid). [Code Annotated (Williams), sec. [illegible].]

Other statutory citations.—Code Annotated (Williams), sections 5789, 5790.

Texas.—Anthrax (human and animal cases), Asiatic cholera, bubonic plague, chancroid, chickenpox, conjunctivitis (acute infectious), dengue, diphtheria (membranous croup), encephalitis (lethargic), epidemic cerebrospinal meningitis, epidemic dysentery (amebic and bacillary), gonorrhea, influenza, leprosy, malaria, measles, mumps, paratyphoid, pellagra, poliomyelitis, pneumonia, relapsing fever, scarlet fever (scarlatina), smallpox, syphilis, trachoma, tuberculosis, typhoid fever, typhus fever, undulant fever, whooping cough, yellow fever. [Reg.; Annotated Statutes (Vernon), Penal Code, art. 1518, Revised Civil Statutes, arts. 4445, 4477 (rules 1, 3, 22, 28).]
Other statutory citations.—Annotated Statutes (Vernon), Revised Civil Statutes, article 1074.

Utah.—Actinomycosis, anthrax (malignant pustule), bubonic plague, cerebrospinal meningitis (epidemic), chancroid, chickenpox, cholera (Asiatic), dengue, diphtheria, dysentery (acute), encephalitis (lethargic), erysipelas, German measles, glanders (farcy), gonorrhea, hookworm, influenza, leprosy, malaria, measles, mumps, ophthalmia neonatorum, paratyphoid fever, pellagra, pneumonia (lobar), pneumonia (broncho), poliomyelitis (infantile paralysis), rabies (hydrophobia), rheumatic fever, Rocky Mountain spotted fever, scarlet fever, septic sore throat, smallpox, syphilis, tetanus, trachoma, trichinosis, tuberculosis, tularemia, typhoid fever, typhus fever, undulant fever, Weil's disease (acute infectious jaundice), whooping cough, yellow fever. [Reg , Code Annotated (1943), secs 35-4-14, 35-4-31, 35-4-35, 35-4-36, 35-4-37]
Other statutory citations.—Code Annotated (1943), sections 35-4-32, 79-4-14, 79-8-14

Vermont.—Actinomycosis, anthrax, bubonic plague, chickenpox, cholera (Asiatic cholera—epidemic cholera), diphtheria, dysentery (epidemic dysentery), epidemic cerebrospinal meningitis, epidemic or streptococcic sore throat, erysipelas, favus, German measles, glanders, hydrophobia (rabies), influenza, leprosy, measles, mumps, ophthalmia neonatorum, pneumonia (lobar or croupous pneumonia), poliomyelitis (infantile paralysis), puerperal fever (puerperal septicemia), scarlet fever (scarlatina—canker rash), smallpox (variola—varioloid), tetanus, trachoma, typhoid fever (enteric fever), typhus fever, undulant fever, Vincent's infection, whooping cough, yellow fever. [Reg]
Tuberculosis [Public Laws (1933), sec 5304.]
Venereal diseases in any form (in charitable patients in public institutions) [Public Laws (1933), sec. 5313.]
Gonorrhea, syphilis [Public Laws (1933), sec. 5314 (as amended by Laws 1941, Act 102)]
Other statutory citations.—Public Laws (1933), sections 5297, 5300, 5301.

Virginia.—Cerebrospinal meningitis, chickenpox, diarrhea and dysentery, diphtheria, encephalitis, gonorrhea, infantile paralysis, influenza, malaria, measles, ophthalmia neonatorum, pellagra, pneumonia, Rocky Mountain spotted fever, scarlet fever, septic sore throat, smallpox, syphilis, tetanus, trachoma, tuberculosis, tularemia, typhoid and paratyphoid fever, typhus fever, undulant fever, whooping cough [Reg , Code (Michie, 1942), secs 1546, 1554b, 1554c, 1554n, 1554o]
Outbreak of infectious jaundice, food poisoning, or any rare or unusual disease of importance to public [Reg]
Chancroid [Code (Michie, 1942), secs 1554b, 1554c]
Other statutory citations —Code (Michie, 1942), sections 1488, 1515, 1515a

Washington.—Actinomycosis, ancylostomiasis, anthrax, ascariasis, avitaminosis, chancroid, chickenpox, cholera, coccidioidal granuloma, conjunctivitis (acute infectious), dengue, diphtheria, dysentery (amebic), dysentery (bacillary), echinococcus, encephalitis (infectious), enterocolitis, erysipelas, favus, filariasis, food infections and poisonings, German measles, glanders, gonorrhea, gonorrheal ophthalmia, icterohemorrhagic jaundice, impetigo contagiosa, influenza, leprosy, lymphogranuloma venereum, malaria, measles, meningococcus meningitis, mumps, plague, pneumonia (acute lobar), poliomyelitis, psittacosis, puerperal infection, rabies (human), rat-bite fever, relapsing fever, ringworm, Rocky Mountain spotted fever, scarlet fever, schistosomiasis, septic sore throat, silicosis, smallpox, syphilis, tetanus, trachoma, trichinosis, tuberculosis (pulmonary), tuberculosis (other than pulmonary), tularemia, typhoid fever group, typhus fever, undulant fever, Vincent's infection, whooping cough, yellow fever
Aniline poisoning, arsenic poisoning, benzine poisoning, benzol poisoning, bisulfide of carbon poisoning, brass poisoning, carbon monoxide poisoning, dinitrobenzene poisoning, lead poisoning, naphtha poisoning, phosphorus poisoning, tetraethyl lead poisoning, turpentine poisoning, wood alcohol poisoning [Reg , Revised Statutes Annotated (Remington), secs 6002, 6057, 6087, 6109]
Other statutory citations —Revised Statutes Annotated (Remington), sections 6095, 6097, 6098.

West Virginia.—Actinomycosis, acute infectious conjunctivitis (ophthalmia neonatorum), ancylostomiasis (hookworm), anthrax, chancroid, chickenpox, cholera, dengue, diphtheria, dysentery (amebic), dysentery (bacillary), epidemic encephalitis (lethargic encephalitis), German measles, glanders, gonorrhea, influenza, leprosy, malaria, Malta fever, measles, meningococcus meningitis (cerebrospinal meningitis), mumps, paratyphoid fever, pellagra, plague, pneumonia, poliomyelitis (infantile paralysis), rabies, Rocky Mountain spotted fever, scarlet fever, septic sore throat, smallpox, tetanus, trachoma, trichiniasis, tuberculosis (pulmonary), tuberculosis (all forms), tularemia, typhoid fever, whooping cough, yellow fever. [Reg , Code (1943), secs 1288, 1289, 1300]
Syphilis. [Code (1943), sec 1300]
Other statutory citations.—Code (1943), section 1278

Wisconsin.—Amebic dysentery, cerebrospinal meningitis (epidemic), chancroid, chickenpox, cholera (Asiatic), diphtheria, encephalitis (sleeping sickness—infectious forms), erysipelas, gonorrhea, infantile paralysis (poliomyelitis, anterior), influenza (in epidemic form), leprosy, malaria, measles, mumps, ophthalmia neonatorum, plague, pneumonia (acute lobar), rubella (rötheln or German measles), scarlet fever, septic sore throat in epidemic form, smallpox, syphilis, trachoma, tuberculosis (of any organ), tularemia, typhoid fever, typhus fever, undulant fever, whooping cough, and yellow fever [Reg , Statutes (1941), secs. 143.01, 143 04, 143.06 (1), 143 07, 143.12 (2), 146 01 (2).]
Cancer, carcinoma, sarcoma, or other malignant growths. [Statutes (1941), sec 140 05 (11).]
Poisoning from lead, phosphorus, arsenic, or mercury, or their compounds, or compressed-air illness, contracted as a result of nature of employment [Statutes, sec. 69.53 (as renumbered and amended by Laws 1943, ch 393, sec 52.]

Wyoming.—Actinomycosis, anthrax, ascariasis, botulism, chancroid, chickenpox, cholera, coccidioidal granuloma, conjunctivitis, (acute infectious), dengue, diphtheria, dysentery (amebic), dysentery (bacillary—specific type if known), encephalitis (infectious—specify type if known), epidemic diarrhea of the newborn, epilepsy, favus, food poisoning, German measles, glanders, gonorrhea, granuloma inguinale, hemorrhagic jaundice (Weil's disease), influenza, jaundice (infectious or epidemic types), leprosy, lymphopathia venereum, malaria, measles, meningitis (due to the meningococcus), meningitis (other—specific type), mumps, ophthalmia neonatorum (conjunctivitis, acute infectious), paratyphoid fever (specify type

A or B), plague, pneumonia (acute lobar), pneumonia (other), poliomyelitis (acute anterior), psittacosis, puerperal infection, rabies, rat-bite fever, relapsing fever, rheumatic fever (acute), Rocky Mountain spotted fever, scarlet fever, septic sore throat, smallpox, syphilis, tetanus, trachoma, trichinosis, tuberculosis (pulmonary), tuberculosis (other), tularemia, typhoid fever, typhus fever, undulant fever (brucellosis), Vincent's infection, whooping cough, yellow fever. [Reg.; Revised Statutes (1931), secs 103-233, 103-234.]

Other statutory citations.—Revised Statutes (1931), section 103-214.

COURT DECISION ON PUBLIC HEALTH

Liability of city for death of child by drowning in sewage disposal plant.—(New Mexico Supreme Court; *Barker* v. *City of Santa Fe*, 136 P.2d 480; decided April 14, 1943.) An action was brought against the city of Santa Fe to recover damages for the death by drowning in the city's sewage disposal plant of a girl less than 10 years of age. The complaint alleged that the disposal plant consisted of tanks filled to a depth of about 18 feet with a discharge from the city's sewers; that a deposit of sludge and filth, with the appearance of ordinary dirt or soil, to a depth of about 2 feet floated on top of the mass in the tanks; that the gates to the enclosure where the tanks were were open and the fence enclosing the tanks was down in several places; that the dangerous condition of the defendant's property described prevailed for about 3 years prior to the accident although repeated protests had been made to the defendant's officers and agents; and that the child, not knowing that it was dangerous to do so, and being deceived by the floating sludge and filth, stepped into one of the tanks and was drowned. The complaint also alleged a condition amounting to the maintenance of a dangerous and attractive nuisance.

The defendant city demurred to the complaint, taking the position that, admitting all facts well pleaded, the complaint did not state facts sufficient to constitute a cause of action for the reason that, in the maintenance and operation of the disposal plant, the city was discharging a governmental function for the negligent performance of which it could not be held liable in damages. The lower court sustained the demurrer and the plaintiff appealed. The Supreme Court of New Mexico, after reviewing various authorities, adopted the view that the city's duty to keep the sewage disposal plant in repair and in safe condition was a corporate function. The plaintiff's allegations of negligence were held to be sufficient as against the attack made thereon by the defendant's demurrer.

With respect to the nuisance phase of the complaint, the appellate court quoted from several authorities, one of which, as an example, was to the effect that a municipality could not create and maintain a nuisance resulting in injury to a person or damage to private property without subjecting itself to civil liability, that this was true whether or not the thing done or omitted resulting in the nuisance constituted negligence, and that the municipality could not escape liability therefor on the ground that in doing so it was exercising a governmental

function. According to the court it seemed to be the city's theory that it was not liable in damages for its negligence and that it could commit a nuisance to the detriment of its inhabitants and others provided the acts alleged to have been committed were done in a governmental capacity. The allegations of the complaint were found by the court to sufficiently charge the defendant with negligent conduct of its corporate affairs in the particulars therein stated and with the maintenance of a nuisance.

The cause was remanded to the lower court with directions to overrule the demurrer.

DEATHS DURING WEEK ENDED FEBRUARY 26, 1944

[From the Weekly Mortality Index, issued by the Bureau of the Census, Department of Commerce]

	Week ended Feb. 26, 1944	Corresponding week, 1943
Data for 90 large cities of the United States		
Total deaths	9,591	10,340
Average for 3 prior years	9,617	
Total deaths, first 8 weeks of year	83,358	81,891
Deaths under 1 year of age	616	730
Average for 3 prior years	621	
Deaths under 1 year of age, first 8 weeks of year	5,016	5,775
Data from industrial insurance companies		
Policies in force	66,316,976	65,395,887
Number of death claims	10,865	12,451
Death claims per 1,000 policies in force, annual rate	8.6	9.9
Death claims per 1,000 policies, first 8 weeks of year, annual rate	11.7	10.6

PREVALENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED MARCH 4, 1944

Summary

An increase was again recorded in the incidence of meningococcus meningitis. A total of 586 cases was reported, as compared with 552 last week, 531 for the corresponding week last year, and a 5-year (1939–43) median of 47. The largest number reported for any corresponding week prior to 1943 was 367, the peak week of incidence in 1930. Increases were reported for the current week in 4 of the 9 geographic areas States reporting 20 or more cases are as follows (last week's figures in parentheses): *Increases*—Massachusetts 28 (9), New York 65 (58), New Jersey 26 (17), Illinois 46 (26), Missouri 26 (25), California 44 (36); *decreases*—Pennsylvania 32 (37), Ohio 27 (30), Michigan 22 (24), Virginia 20 (29), Tennessee 29 (30). The cumulative total for the year to date is 5,073, as compared with 3,515 for the same period last year and a 5-year median of 481.

Increased incidence was also reported for measles and scarlet fever, the totals being 34,238 cases of measles and 6,985 of scarlet fever representing increases of about 26 percent and 9 percent, respectively. Most of the increase in scarlet fever occurred in the East North Central area, where 2,021 cases were reported, as compared with 1,553 for the preceding week The increase in measles is largely accounted for by 7,295 cases reported in Ohio, where only 2,103 cases were reported last week. Cumulative totals for the year to date for these diseases are 175,273 cases of measles and 47,413 of scarlet fever, more than for the corresponding periods of any prior year since 1938 and 1939, respectively.

The current and cumulative figures for diphtheria, poliomyelitis, smallpox, and whooping cough, are below the respective 5-year medians, while the current total of typhoid fever cases reported (49) is less than for the corresponding week of any year since 1939. The cumulative total for typhoid fever to date, however, is 700, as compared with 465 last year and a 5-year median of 670.

Deaths recorded for the week in 89 large cities of the United States totaled 9,710, as compared with 9,564 last week and a 3-year (1941–43) average of 9,381. The cumulative total to date this year is 92,813, as compared with 91,360 for the same period last year.

Telegraphic morbidity reports from State health officers for the week ended March 4, 1944, and comparison with corresponding week of 1943 and 5-year median

In these tables a zero indicates a definite report, while leaders imply that, although none was reported, cases may have occurred.

Division and State	Diphtheria			Influenza			Measles			Meningitis, meningococcus		
	Week ended		Median 1939–43	Week ended		Median 1939–43	Week ended		Median 1939–43	Week ended		Median 1939–43
	Mar. 4, 1944	Mar. 6, 1943		Mar. 4, 1944	Mar. 6, 1943		Mar. 4, 1944	Mar. 6, 1943		Mar. 4, 1944	Mar. 6, 1943	
NEW ENGLAND												
Maine	1	1	1	1	------	3	257	1	88	5	8	0
New Hampshire	0	0	0	4	------	------	0	31	23	1	0	0
Vermont	0	0	0	16	------	------	114	412	23	1	2	0
Massachusetts	11	2	3	------	------	------	597	910	682	28	23	4
Rhode Island	1	0	0	------	1	------	424	27	27	11	19	0
Connecticut	0	0	1	5	2	7	443	259	259	11	9	1
MIDDLE ATLANTIC												
New York	13	24	23	[1] 10	[1] 12	[1] 68	2,401	2,040	1,224	65	63	5
New Jersey	3	2	7	6	17	24	1,496	1,299	322	26	25	1
Pennsylvania	8	8	16	5	3	------	976	2,891	254	32	29	7
EAST NORTH CENTRAL												
Ohio	8	7	12	38	8	18	7,295	292	261	27	6	3
Indiana	12	9	11	44	30	52	320	400	50	12	10	1
Illinois	13	16	18	42	23	49	1,157	835	493	46	15	1
Michigan [2]	3	0	4	2	5	20	1,396	40	241	22	9	0
Wisconsin	5	0	0	96	50	173	1,683	958	668	10	4	0
WEST NORTH CENTRAL												
Minnesota	4	3	3	1	0	7	1,623	58	253	8	4	0
Iowa	19	3	3	10	10	65	348	298	298	1	2	0
Missouri	4	4	12	10	6	18	426	387	141	26	29	1
North Dakota	1	0	0	211	------	44	195	53	53	5	0	0
South Dakota	1	5	2	------	------	1	68	125	21	0	0	0
Nebraska	6	3	0	7	55	2	56	371	49	2	5	0
Kansas	7	6	5	9	14	41	781	428	428	4	3	1
SOUTH ATLANTIC												
Delaware	0	0	0	------	------	------	9	52	7	3	1	0
Maryland [2]	10	36	5	29	18	55	845	46	115	14	21	2
District of Columbia	0	2	2	2	3	4	136	113	46	2	4	2
Virginia	4	6	12	659	595	1,509	953	338	252	20	31	0
West Virginia	2	4	5	43	38	113	1,377	32	32	3	3	0
North Carolina	11	6	13	19	75	75	1,731	33	490	13	23	3
South Carolina	1	3	4	657	705	1,028	435	59	59	11	13	1
Georgia	5	10	8	115	261	261	565	143	153	9	4	1
Florida	[3] 2	2	5	8	3	9	306	47	165	[3] 17	5	0
EAST SOUTH CENTRAL												
Kentucky	2	5	7	207	7	107	205	854	71	11	13	3
Tennessee	5	5	4	108	42	187	314	259	80	29	7	1
Alabama	3	10	6	232	155	490	480	65	224	17	16	1
Mississippi [2]	4	3	4	------	------	------	------	------	------	7	9	0
WEST SOUTH CENTRAL												
Arkansas	0	5	4	174	108	711	126	90	90	1	5	0
Louisiana	4	1	5	214	8	30	381	178	85	12	16	3
Oklahoma	12	5	6	300	76	209	107	34	34	9	0	0
Texas	32	35	37	1,359	1,634	1,658	1,016	472	472	12	6	4
MOUNTAIN												
Montana	2	1	0	38	8	25	186	162	90	0	1	0
Idaho	0	0	0	------	------	1	114	149	79	0	2	0
Wyoming	1	0	0	9	14	14	73	122	80	1	1	1
Colorado	4	6	7	67	30	64	404	607	167	4	1	1
New Mexico	0	2	2	2	1	8	47	12	38	0	1	0
Arizona	1	1	3	184	115	181	376	29	31	1	10	0
Utah [2]	0	1	1	139	71	20	52	445	130	0	9	0
Nevada	0	0	0	22	10	------	5	2	0	0	0	0
PACIFIC												
Washington	1	7	4	3	------	4	151	841	352	5	31	1
Oregon	3	1	1	55	29	80	76	456	391	8	12	0
California	23	20	20	87	77	101	1,712	741	741	44	46	5
Total	252	270	279	5,249	4,319	10,117	34,238	18,496	17,191	536	556	47
9 weeks	[3] 2,282	2,750	2,909	306,514	40,673	51,047	175,273	114,932	106,124	[3] 5,073	3,515	481

See footnotes at end of table.

Telegraphic morbidity reports from State health officers for the week ended March 4, 1944, and comparison with corresponding week of 1943 and 5-year median—Continued

Division and State	Poliomyelitis			Scarlet fever			Smallpox			Typhoid and paratyphoid fever [4]		
	Week ended		Median 1939–43	Week ended		Median 1939–43	Week ended		Median 1939–43	Week ended		Median 1939–43
	Mar. 4, 1944	Mar. 6, 1943		Mar. 4, 1944	Mar. 6, 1943		Mar. 4, 1944	Mar. 6, 1943		Mar. 4, 1944	Mar. 6, 1943	
NEW ENGLAND												
Maine	0	1	0	37	4	6	0	0	0	0	0	0
New Hampshire	0	0	0	11	14	4	0	0	0	0	0	0
Vermont	0	0	0	13	8	7	0	0	0	0	0	0
Massachusetts	0	0	0	390	476	229	0	0	0	0	1	1
Rhode Island	0	0	0	17	27	15	0	0	0	0	0	0
Connecticut	0	0	0	85	61	61	0	0	0	2	1	1
MIDDLE ATLANTIC												
New York	1	3	1	548	569	569	0	0	0	0	6	6
New Jersey	0	0	0	240	136	199	0	0	0	1	1	1
Pennsylvania	2	0	0	594	0	389	0	0	0	7	5	4
EAST NORTH CENTRAL												
Ohio	1	0	1	736	298	399	0	0	1	0	0	3
Indiana	1	0	0	205	127	168	1	7	1	11	0	1
Illinois	0	0	1	470	213	475	0	1	4	1	0	2
Michigan [2]	0	0	0	250	113	280	0	0	0	0	1	1
Wisconsin	0	0	0	360	303	176	0	0	5	0	1	0
WEST NORTH CENTRAL												
Minnesota	0	0	0	261	79	111	0	0	5	0	0	0
Iowa	0	0	0	171	92	65	5	1	1	1	1	0
Missouri	0	0	0	117	118	97	0	0	4	1	0	1
North Dakota	0	0	0	38	10	15	0	0	0	1	0	0
South Dakota	0	0	0	35	21	21	0	1	1	0	0	0
Nebraska	1	1	0	96	67	41	0	3	0	0	0	0
Kansas	0	0	0	126	76	83	0	0	0	0	2	0
SOUTH ATLANTIC												
Delaware	0	0	0	6	6	7	0	0	0	0	0	0
Maryland [2]	0	0	0	230	91	61	0	0	0	2	8	1
District of Columbia	0	0	0	232	26	20	0	0	0	0	0	0
Virginia	0	1	0	63	42	35	0	0	0	0	4	2
West Virginia	0	0	0	100	30	40	0	1	0	1	0	0
North Carolina	0	1	1	37	45	45	0	0	0	0	1	0
South Carolina	0	0	0	11	8	5	0	0	0	0	0	1
Georgia	0	0	0	17	11	13	0	0	0	1	3	3
Florida	1	1	0	17	12	12	0	0	0	2	0	5
EAST SOUTH CENTRAL												
Kentucky	0	0	0	73	61	88	0	0	0	2	1	2
Tennessee	1	1	0	65	48	73	0	0	2	2	1	3
Alabama	0	1	1	22	26	18	0	0	0	0	0	1
Mississippi [2]	0	1	1	4	10	8	0	1	0	0	2	2
WEST SOUTH CENTRAL												
Arkansas	0	0	0	6	5	6	0	1	1	1	1	1
Louisiana	0	0	1	4	11	11	0	0	0	0	1	4
Oklahoma	0	0	0	50	27	27	0	0	1	0	0	1
Texas	1	4	1	82	63	67	4	0	5	8	4	4
MOUNTAIN												
Montana	0	0	0	49	11	27	0	0	0	0	0	0
Idaho	0	0	0	77	2	6	0	0	0	0	0	0
Wyoming	0	0	0	14	67	6	0	0	0	0	0	1
Colorado	1	0	0	70	53	36	0	0	0	0	2	2
New Mexico	0	0	0	11	5	10	0	0	0	1	0	0
Arizona	0	1	0	13	12	12	1	0	0	0	1	1
Utah [2]	0	0	0	156	73	24	0	0	0	0	0	0
Nevada	0	0	0	5	0	0	0	0	0	0	0	0
PACIFIC												
Washington	1	1	0	278	26	63	0	0	0	0	1	2
Oregon	1	0	0	143	14	14	0	0	0	1	5	1
California	3	2	2	350	144	144	0	0	0	3	2	2
Total	15	19	18	6,985	3,741	4,357	11	16	37	49	56	75
9 weeks	224	247	247	47,413	34,156	34,622	124	245	412	700	465	670

See footnotes at end of table.

Telegraphic morbidity reports from State health officers for the week ended March 4, 1944, and comparison with corresponding week of 1943 and 5-year median—Continued

Division and State	Whooping cough, Week ended Mar. 4, 1944	Whooping cough, Week ended Mar. 6, 1943	Whooping cough, Median 1939-43	Week ended Mar. 4, 1944: Anthrax	Dysentery: Amebic	Dysentery: Bacillary	Dysentery: Unspecified	Encephalitis, infectious	Leprosy	Rocky Mt. spotted fever	Tularemia	Typhus fever
NEW ENGLAND												
Maine	17	29	29	0	0	0	0	1	0	0	0	0
New Hampshire	1	12	12	0	0	0	0	0	0	0	0	0
Vermont	35	35	35	0	0	0	0	0	0	0	0	0
Massachusetts	63	173	183	0	0	0	0	0	0	0	0	0
Rhode Island	15	33	33	0	0	0	0	0	0	0	0	0
Connecticut	39	40	63	0	0	2	0	2	0	0	0	0
MIDDLE ATLANTIC												
New York	127	397	491	0	2	13	0	0	0	0	0	0
New Jersey	54	209	209	0	19	0	0	0	0	0	0	0
Pennsylvania	131	346	341	0	5	2	0	0	0	0	0	0
EAST NORTH CENTRAL												
Ohio	179	177	170	0	0	0	9	1	0	0	0	0
Indiana	29	40	33	0	0	0	0	1	0	0	0	0
Illinois	53	177	170	0	0	0	0	1	0	0	1	0
Michigan [2]	90	191	191	0	0	2	0	0	0	0	0	0
Wisconsin	68	269	268	0	0	0	0	0	0	0	0	0
WEST NORTH CENTRAL												
Minnesota	27	91	43	0	0	0	0	0	0	0	0	0
Iowa	8	27	19	0	0	0	0	0	0	0	0	0
Missouri	12	9	12	0	0	0	2	0	0	0	0	0
North Dakota	8	22	14	0	0	0	0	0	0	0	0	0
South Dakota	4	0	1	0	0	0	0	0	0	0	0	0
Nebraska	30	4	4	0	0	0	0	0	0	0	0	0
Kansas	31	59	58	0	0	0	0	0	0	0	0	0
SOUTH ATLANTIC												
Delaware	0	15	8	0	0	0	0	0	0	0	0	0
Maryland [2]	28	109	84	0	0	0	2	1	0	0	0	0
District of Columbia	3	22	17	0	0	0	0	0	0	0	0	0
Virginia	55	77	67	0	0	0	42	0	0	0	3	0
West Virginia	25	40	42	0	0	0	0	0	0	0	0	0
North Carolina	196	178	178	0	0	1	0	0	0	0	0	1
South Carolina	61	28	83	0	0	3	0	0	0	0	0	1
Georgia	21	37	37	0	0	1	0	0	0	0	0	6
Florida	32	19	21	0	1	0	0	1	0	0	0	5
EAST SOUTH CENTRAL												
Kentucky	51	28	52	0	0	0	0	0	0	0	0	0
Tennessee	24	50	41	0	0	0	1	0	0	0	1	0
Alabama	23	8	12	0	0	0	0	0	0	0	0	11
Mississippi [2]	0		----	0	0	0	0	0	0	0	7	0
WEST SOUTH CENTRAL												
Arkansas	15	20	17	0	0	3	0	0	0	0	0	0
Louisiana	0	2	6	0	0	1	0	0	0	0	0	0
Oklahoma	5	25	9	0	0	0	0	0	0	0	0	0
Texas	130	485	167	0	6	108	0	10	0	0	0	7
MOUNTAIN												
Montana	3	18	10	0	0	0	0	0	0	0	0	0
Idaho	16	2	8	0	0	0	0	0	0	0	0	0
Wyoming	3	2	1	0	0	0	0	0	0	0	0	0
Colorado	25	28	35	0	0	1	0	0	0	0	0	0
New Mexico	1	21	21	0	0	0	0	0	0	0	0	0
Arizona	42	17	19	0	0	0	33	0	0	0	0	0
Utah [2]	15	54	54	0	0	0	0	0	0	0	0	0
Nevada	0	6	0	0	0	0	0	0	0	0	0	0
PACIFIC												
Washington	55	18	32	0	0	0	0	0	0	0	0	0
Oregon	19	13	13	0	0	0	0	0	0	0	0	0
California	72	272	272	0	1	8	0	1	0	0	0	0
Total	1,953	3,934	3,934	0	34	140	89	19	0	0	12	31
9 weeks	16,418	34,878	36,162	7	216	1,873	577	91	5	2	92	38

[1] New York City only. [2] Period ended earlier than Saturday.
[3] Later information from Florida shows 10 cases of meningitis for the week ended Jan. 22, and 5 cases of diphtheria for the week ended Feb. 12, instead of the figures previously reported.
[4] Including paratyphoid fever cases reported separately as follows: Connecticut, 1; New Jersey, 1.

NOTIFIABLE DISEASES, FOURTH QUARTER 1943 [1]

The figures in the following table are the totals of the monthly morbidity reports received from the State health authorities for October, November, and December 1943. They are preliminary and therefore incomplete. In most instances they include cases reported in both the civilian and military populations. The comparisons made are with similar preliminary reports. Each State health officer has been requested to include in the monthly report for his State all diseases that are required by law or regulation to be reported in the State. The lists of diseases required to be reported are not the same for each State, although the most common communicable diseases are notifiable in all the States. Certain diseases, however, may be a health problem in some States but not in others. There are variations among the States also in the degree of completeness of reporting of cases. As compared with the deaths, incomplete case reports are obvious for such diseases as malaria, pellagra, pneumonia, and tuberculosis, while in many States other diseases, such as puerperal septicemia and Vincent's infection, are not reportable.

In spite of these known deficiencies, however, these monthly reports, which are published quarterly and annually in consolidated form, have proved of value in presenting early information regarding the reported incidence of a large group of diseases and in indicating a trend by providing a comparison with similar preliminary figures for prior years. To some extent they also give a picture of the geographic prevalence of certain diseases, as the States are arranged by geographic location.

Leaders are used in the table to indicate that no case of the disease was reported.

Consolidated monthly State morbidity reports for October, November, and December 1943

Division and State	Anthrax	Chickenpox	Diphtheria	Dysentery, amebic	Dysentery, bacillary	Dysentery, undefined	Encephalitis, infectious	German measles	Hookworm disease	Influenza	Malaria	Measles	Meningitis, meningococcus	Mumps	Ophthalmia neonatorum	Pellagra	Pneumonia, all forms	Poliomyelitis
NEW ENGLAND																		
Maine	------	603	16	------	------	------	------	29	------	206	2	952	31	21	------	------	136	4
New Hampshire	------	140	------	------	------	------	1	7	------	28	------	55	8	111	------	------	14	8
Vermont	------	603	1	------	------	------	------	58	------	292	------	255	5	242	------	------	44	12
Massachusetts	2	3,384	91	------	76	------	9	264	------	------	52	2,537	154	1,226	60	------	961	97
Rhode Island	------	296	12	------	9	------	------	12	------	1,045	4	747	55	63	------	------	112	55
Connecticut	------	1,572	11	------	43	------	2	50	1	1,657	[illegible]	90	70	299	1	------	1,061	79
MIDDLE ATLANTIC																		
New York	2	4,140	90	22	497	------	22	175	------	[2] 1,062	31	4,163	462	[2] 523	15	------	7,649	243
New Jersey	1	3,868	31	19	2	7	2	210	------	941	7	3,571	167	3,675	------	------	1,834	19
Pennsylvania	12	5,902	140	4	13	------	3	------	------	190	2	3,135	311	2,108	6	1	1,910	58
EAST NORTH CENTRAL																		
Ohio	------	4,116	154	1	8	------	2	129	------	17,683	11	9,264	156	417	158	------	984	55
Indiana	------	748	170	------	------	2	4	133	------	2,593	121	1,055	67	269	------	------	196	29
Illinois	------	2,860	98	17	37	------	12	95	------	1,691	63	1,006	236	972	75	8	8,352	340
Michigan	------	4,234	121	12	69	------	6	172	------	979	46	5,392	224	790	6	------	1,220	60
Wisconsin	------	7,033	56	------	------	------	3	230	------	5,401	6	4,563	67	1,507	1	------	435	97

WEST NORTH CENTRAL																		
Minnesota		2,276	192	26	1	2	1			351		5,168	49				88	53
Iowa		986	35	5			2	108		22,664	4	417	19	161			171	54
Missouri		419	65		1	13				574	2	125	119	54	1		276	51
North Dakota		221	40		3		1			3,788		2,717	6	72			334	11
South Dakota		281	46				1			28	2	334	3	129			27	4
Nebraska		396	66				1			821	3	80	9	170			47	26
Kansas		1,657	75	2	5		3	56		5,247	23	165	33	236			378	124
SOUTH ATLANTIC																		
Delaware		58	1							6		129	17	3			6	1
Maryland		1,036	68	1	24	10	3	32		4,730	2	301	99	332	1		1,211	8
District of Columbia		94	10	1	1					3,053	10	179	48	68			430	5
Virginia		764	157	1		1,165				30,125	72	3,213	107	350		5	1,251	20
West Virginia		375	93				1			6,458		684	29	66			45	9
North Carolina		1,338	323	1	1					463	21	1,203	49			2	230	8
South Carolina		134	606	1	42			58	184	6,382	1,904	449	25	192		125	919	4
Georgia		301	223	3	42				954	10,076	101	471	35	279		8	392	7
Florida		181	117	44	164		8	12	1,709	442	26	193	44	202	2	2	536	5
EAST SOUTH CENTRAL																		
Kentucky		757	126		15		1			62,295	14	145	73	179			252	42
Tennessee		245	187	4		38	1	8		1,971	17	243	65	64	12	13	504	2
Alabama		250	286	1				4		3,433	778	731	34	143		16	933	9
Mississippi		1,160	126	260	1,234				1,003	46,856	3,363	614	42	899	21	507	5,184	7
WEST SOUTH CENTRAL																		
Arkansas		210	90	14	101		1	19		7,959	122	242	7	86		5	515	7
Louisiana		104	89	20	35			22	9	4,501	99	60	36	45	1	2	315	17
Oklahoma		127	70	3	43		2		3	2,877	295	122	24	41		11	218	109
Texas		1,615	537	285	4,241		7			25,043	1,584	561	59	265	15	266	2,810	156
MOUNTAIN																		
Montana		749	19		2	3	2			5,712	2	1,012	7	390			83	10
Idaho		145	4				1			83		34	2	114			37	2
Wyoming		195	5				1	4		2,630	1	136	4	176			53	19
Colorado		622	78	1			1			3,370	8	1,018	16	411			547	84
New Mexico		64	15	3	36	15	2			297	5	19	11	17		3	193	22
Arizona		95	41	2		271	2	5		4,881	22	120	14	116	5	9	610	6
Utah		557					3	34		8,758	179	66	16	356			186	121
Nevada		13	1	1	2	31				2,350		24	3	31			75	7

[1] For reports for first three quarters of 1943, see PUBLIC HEALTH REPORTS for June 11, 1943, page 938, October 8, 1943, page 1521, and December 3, 1943, page 1784.

[3] New York City only.

Consolidated monthly State morbidity reports for October, November, and December 1943—Continued

Division and State	Anthrax	Chickenpox	Diphtheria	Dysentery, amebic	Dysentery, bacillary	Dysentery, undefined	Encephalitis, infectious	German measles	Hookworm disease	Influenza	Malaria	Measles	Meningitis, meningococcus	Mumps	Ophthalmia neonatorum	Pellagra	Pneumonia, all forms	Poliomyelitis
PACIFIC																		
Washington	------	2,532	117	4	3	8	3	243	------	98	------	513	63	817	------	------	476	164
Oregon	------	882	34	4	------	4	1	------	------	4,667	4	503	36	334	------	------	369	260
California	4	4,879	435	45	124	------	30	746	------	11,737	896	1,349	258	4,212	------	------	959	632
1943	21	65,217	5,458	807	6,874	1,569	145	2,965	3,863	328,994	9,911	60,125	3,484	23,233	380	978	40,570	3,222
1942	16	63,810	6,761	561	3,839	2,379	138	3,931	5,188	35,648	11,128	36,420	1,111	30,388	397	1,093	33,201	1,415
Median, 1938–42	16	67,016	7,798	615	3,086	376	222	[3] 3,284	6,105	40,316	14,696	38,721	431	23,923	368	1,699	28,802	2,366
Alaska	------	5	4	------	------	------	------	------	------	568	1	855		48	------	------	31	4
Hawaii Territory	------	183	3	6	64	------	1	11	13	1,562	51	14	17	502	------	------	25	3
Panama Canal Zone [4]	------	16	15	7	12	------	------	42	------	------	499	3	3	338	------	------	[5] 16	------

Division and State	Puerperal septicemia	Rabies in animals	Rabies in man	Rocky Mountain spotted fever	Scarlet fever	Septic sore throat	Smallpox	Tetanus	Trachoma	Trichinosis	Tuberculosis, all forms	Tuberculosis, respiratory	Tularemia	Typhoid and paratyphoid fever	Paratyphoid fever	Typhus fever	Undulant fever	Vincent's infection	Whooping cough
NEW ENGLAND																			
Maine	------	------	------	------	273	4	------	------	------	------	84	79	------	10	------	------	15	35	169
New Hampshire	------	------	------	------	80	------	------	------	------	------	57	-	------	3	------	------	3	------	22
Vermont	------	------	------	------	83	------	------	------	------	------	29		------	11	------	------	8	10	299
Massachusetts	------	3	------	------	2,310	41	------	3	3	1	776	720	1	34	25	2	15	------	1,071
Rhode Island	------	------	------	------	103	26	------	1	------	------	210	206	2	6	1	------	4	6	350
Connecticut	------	------	------	------	462	45	------	4	------	1	265	255	------	11	1	------	21	------	367
MIDDLE ATLANTIC																			
New York	------	61	------	1	3,111	65	------	5	------	33	3,178	2,909	1	86	20	6	93	------	3,138
New Jersey	------	------	------	------	893	13	------	3	------	1	892	------	1	19	1	------	14	------	1,030
Pennsylvania	------	------	------	2	2,207	------	------	------	1	------	1,137	------	4	78	------	1	20	------	1,888

[3] 3-year (1940–42) average.

[4] Includes the cities of Colon and Panama.

[5] In the Canal Zone only

EAST NORTH CENTRAL																			
Ohio			1		3,257	13		6	5	2	1,221	1,188	8	48	4		38	29	1,453
Indiana				1	797	2	14		2		888	754	8	17			16	95	313
Illinois		68		1	1,749	38	19	13	79	1	2,110	1,914	15	27	1	1	59	110	1,431
Michigan		4			1,624	186	6	4	2	6	1,857		2	33	7		19	86	1,993
Wisconsin					1,714	13	3		4		430		9	8			38		2,013
WEST NORTH CENTRAL																			
Minnesota					1,057	8		1			434			2			63	6	562
Iowa		4			799	14	5				120	120	1	16			107		350
Missouri					580	3		2	137		486		2	23			6	6	207
North Dakota				1	134	5	1		6		100	92		6			1	23	147
South Dakota					230	4	1				53		1	2			5	1	76
Nebraska					350		7				47			2			5		167
Kansas		1			1,093	7	8	3			185	184	6	8	1	1	47	64	370
SOUTH ATLANTIC																			
Delaware		3			39						39	39		4					30
Maryland		5			597	32		3	1		750	736	7	8	1		1	18	489
District of Columbia		53	1		243						573	558		5			1		86
Virginia				4	612	244					799	799	18	52	6	17	9		1,110
West Virginia					921	7	1				363			36					310
North Carolina				2	1,457	123	2				439	424	6	17		71	2		1,876
South Carolina		40		1	146	118	2				143		1	26	5	71	5		647
Georgia			1		384	66		18			613	612	5	36	8	408	18	39	153
Florida		1			124	5	1	12			270		1	28	17	81	6	137	259
EAST SOUTH CENTRAL																			
Kentucky				3	733	31	2				519	504	7	121	2		7		895
Tennessee	1				700	41	1	3	1	1	842		5	35	2	23	9	78	580
Alabama		27			267		2	14			613		3	15		269	17		194
Mississippi	53				161		3		13		422	414	12	32		46	8		2,115
WEST SOUTH CENTRAL																			
Arkansas		61			89	97	12	1	198		201	178	6	24	2	5	2		223
Louisiana		30	1	1	112	69	1	4			457	455	3	34	1	86	14		40
Oklahoma				3	409	28		1			602		4	48			11	1	37
Texas			1		609	53	14		25		1,750		4	111	10	397	69		1,364
MOUNTAIN																			
Montana				1	341	4	2				82		6	8			2		108
Idaho					325	7					11	7		10			1		49
Wyoming					48	1		1	27		27		3	3			1	7	71
Colorado					345	6	1				291			13			7		513
New Mexico	2	20			82	7			29		363	343		35	1		4		67
Arizona					179	6			106		302		1	8			4		238
Utah					639	2					24	24	6	13			4		238
Nevada	1				18	12			4	2	22		1	3			2	56	17

Consolidated monthly State morbidity reports for October, November, and December 1943—Continued

Division and State	Puerperal septicemia	Rabies in animals	Rabies in man	Rocky Mountain spotted fever	Scarlet fever	Septic sore throat	Smallpox	Tetanus	Trachoma	Trichinosis	Tuberculosis, all forms	Tuberculosis, respiratory	Tularemia	Typhoid and paratyphoid fever	Paratyphoid fever	Typhus fever	Undulant fever	Vincent's infection	Whooping cough
PACIFIC																			
Washington				1	1,232	7			26		488	476		9	1		9	24	826
Oregon				2	637	8			2	1	125			15	3		8	56	352
California		159	1	1	2,643			19	16	8	2,402	2,277	2	73	4	9	91		1,368
1943	57	540	6	25	36,998	1,461	108	121	687	57	28,091	16,267	162	1,272	124	1,494	909	887	31,671
1942	86	377	13	16	32,554	1,159	218	93	499	63	27,058	12,626	192	1,410		1,146	612	457	40,783
Median, 1938-42	91	643	8	20	32,746	2,042	579	111	808	66	24,053	12,891	696	2,139		850	781	560	46,075
Alaska											54	6		1	1				40
Hawaii Territory					18	6		3	4	3	86	80		3	1	64	1		263
Panama Canal Zone [1]					3						[2] 4	[2] 4		10	6	1			[2] 2

[1] Includes the cities of Colon and Panama.
[2] In the Canal Zone only.

The following list includes certain rare conditions, diseases of restricted geographical distribution, and those reportable in or reported by only a few States:

Actinomycosis: Illinois, 2; Michigan, 3; Minnesota, 6; North Dakota, 1
Botulism: New York, 1; California, 1.
Coccidioidomycosis: Indiana, 1; Arizona, 53; California, 4.
Conjunctivitis: Massachusetts, 77 (suppurative); Connecticut, 4 (infectious), Illinois, 1, (kerato); Michigan, 27 (kerato), 22 (pink eye); Kansas, 1 (pink eye); Maryland, 21; Georgia, 4; Florida, 2; Tennessee, 1 (kerato); Wyoming, 1 (pink eye, 2), New Mexico, 1; Arizona, 8; Nevada, 4; Washington, 5; California, 9 (includes ophthalmia neonatorum); Hawaii Territory, 49.
Dengue: Mississippi, 1; Texas, 28; Nevada, 1; California, 1; Hawaii Territory, 1,041.
Diarrhea and enteritis: Rhode Island, 4; New Jersey, 41 (diarrhea of newborn); Ohio, 138; Michigan, 14 (diarrhea of newborn); North Dakota, 1; Maryland, 72 (diarrhea only); South Carolina, 1,667 (diarrhea only), Florida, 2 (infant diarrhea); New Mexico, 117; Nevada, 20 (infant diarrhea); Washington, 16 (enteritis only); California, 30 (diarrhea of newborn).
Dog bites: Illinois, 1,958 (all animals); Michigan, 1,297.
Food poisoning Ohio, 8; Illinois, 155; Maryland, 36; New Mexico, 2; Arizona, 69; Nevada, 11, California, 434
Granuloma Ohio, 3 (unspecified); Missouri, 19 (inguinale); Tennessee, 10 (inguinale); Mississippi, 278 (inguinale); Louisiana, 17 (inguinale); Arizona, 3 (inguinale); Washington, 1 (inguinale).
Impetigo contagiosa: Ohio, 26, Illinois, 21; Michigan, 535; North Dakota, 13; South Dakota, 1; Kansas, 23; Maryland, 1, Oklahoma, 17; Idaho, 2; Wyoming, 1; Nevada, 1; Washington, 40; Oregon, 168; Alaska, 7; Hawaii Territory, 45.
Jaundice (all forms). Tr.diana, 2; Minnesota, 4; Maryland, 2; Florida, 1; Wyoming, 1; Arizona, 2; Utah, 2; California, 29.
Leprosy· New York, 4; Louisiana, 1; Texas, 3; California, 4; Hawaii Territory, 10.
Lymphocytic choriomeningitis· Illinois, 2.
Lymphogranuloma venereum· Missouri, 15; Florida, 24; Tennessee, 34; Louisiana, 58.
Plague (human): Hawaii Territory, 2.
Rat-bite fever: Tennessee, 2.
Relapsing fever· Texas, 9.
Rheumatic fever: Illinois, 43; Michigan, 25; Missouri, 7; Maryland, 65; Georgia, 17; Wyoming, 10; Arizona, 2; Utah, 18; California, 87.
Weil's disease: Michigan, 20; Maryland, 4; Hawaii Territory, 12.

WEEKLY REPORTS FROM CITIES

City reports for week ended February 19, 1944

This table lists the reports from 87 cities of more than 10,000 population distributed throughout the United States, and represents a cross section of the current urban incidence of the diseases included in the table.

	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
NEW ENGLAND												
Maine:												
Portland	0	0	------	0	6	0	4	0	12	0	0	1
New Hampshire:												
Concord	0	0	-----	0	2	1	0	0	0	0	0	0
Vermont:												
Barre	0	0	-----	0	0	0	0	0	0	0	0	0
Massachusetts:												
Boston	3	0	------	0	39	8	22	0	76	0	0	13
Fall River	0	0	------	0	9	1	0	0	6	0	0	1
Springfield	0	0	------	0	41	0	1	0	17	0	0	2
Worcester	0	0	------	0	1	2	9	0	81	0	0	4
Rhode Island:												
Providence	0	0	1	0	198	3	4	0	7	1	0	9
Connecticut:												
Bridgeport	0	0	2	0	19	0	0	0	2	0	0	0
Hartford	0	0	-----	0	1	3	1	0	8	0	0	1
New Haven	0	0	------	0	83	1	2	0	7	0	0	3
MIDDLE ATLANTIC												
New York:												
Buffalo	0	0	------	1	4	3	14	0	17	0	0	8
New York	8	1	7	1	1,036	28	87	1	317	0	3	89
Rochester	0	0	------	1	1	4	6	0	10	0	0	0
Syracuse	0	0	------	0	3	2	2	0	10	0	0	7
New Jersey:												
Camden	0	0	------	0	1	1	2	0	31	0	0	3
Newark	0	0	2	0	65	2	7	0	14	0	0	0
Trenton	0	0	2	0	2	0	2	0	16	0	0	0
Pennsylvania:												
Philadelphia	3	0	8	1	26	13	35	0	61	0	0	18
Pittsburgh	0	0	3	2	376	9	17	0	26	0	0	2
Reading	0	0	1	0	0	0	4	0	2	0	0	1
EAST NORTH CENTRAL												
Ohio:												
Cincinnati	2	0	1	3	22	8	5	0	34	0	0	1
Cleveland	0	0	6	1	994	8	9	0	62	0	2	13
Columbus	0	0	2	2	130	0	1	0	5	0	0	9
Indiana:												
Fort Wayne	0	0	------	0	7	1	5	0	2	0	0	0
Indianapolis	3	0	------	0	18	2	8	0	46	0	0	3
South Bend	0	0	------	0	2	0	0	0	1	0	0	0
Terre Haute	0	0	------	1	0	0	4	0	0	0	0	0
Illinois:												
Chicago	2	0	3	1	4	13	15	0	125	0	0	19
Springfield	0	0	------	0	83	0	1	0	4	0	0	1
Michigan:												
Detroit	5	0	5	3	69	8	20	2	74	0	1	12
Flint	0	0	------	0	8	1	3	0	3	0	1	0
Grand Rapids	0	0	------	0	293	0	0	0	19	0	0	0
Wisconsin:												
Kenosha	0	0	------	0	1	0	0	0	2	0	0	0
Milwaukee	1	0	------	0	40	1	0	0	89	0	0	19
Racine	0	0	------	0	1	0	0	0	4	0	0	6
Superior	1	0	------	0	4	1	0	0	23	0	0	2
WEST NORTH CENTRAL												
Minnesota:												
Duluth	0	0	------	1	24	0	3	0	24	0	0	7
Minneapolis	4	0	------	1	453	0	2	0	49	0	0	3
St. Paul	0	0	------	0	390	0	3	0	40	0	0	1

City reports for week ended February 19, 1944—Continued

	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
EAST NORTH CENTRAL—continued												
Missouri:												
Kansas City	0	0	----	0	17	4	10	0	38	0	0	5
St. Joseph	0	0	----	0	1	1	0	0	3	0	0	0
St. Louis	3		4	4	195	16	23	0	32	0	2	3
Nebraska:												
Omaha	2	0	----	0	2	0	5	0	31	0	0	0
Kansas:												
Topeka	0	0	----	0	1	0	4	0	2	0	0	6
Wichita	0	0	----	0	337	2	6	0	10	0	0	0
SOUTH ATLANTIC												
Delaware:												
Wilmington	1	0	----	0	3	0	2	0	2	0	0	0
Maryland:												
Baltimore	5	0	8	1	506	8	16	0	65	0	0	13
Cumberland	0	0	----	0	0	0	0	0	0	0	0	0
Frederick	0	0	----	0	0	0	1	0	0	0	0	0
District of Columbia:												
Washington	0	0	----	1	112	1	12	1	221	0	0	1
Virginia:												
Lynchburg	0	0	12	0	12	1	1	0	1	0	0	3
Richmond	0	0	5	4	169	4	3	0	6	0	0	1
Roanoke	0	0	----	0	103	0	5	0	0	0	0	0
West Virginia:												
Charleston	0	0		0	0	0	0	0	7	0	0	0
Wheeling	0	0	1	0	4	0	0	0	5	0	0	0
North Carolina:												
Wilmington	0	0	----	0	49	0	1	0	2	0	0	2
Winston-Salem	0	0	----	0	54	1	2	0	0	0	0	1
South Carolina:												
Charleston	0	0	16	0	46	3	1	0	0	0	0	0
Georgia:												
Atlanta	0	0	25	1	62	0	4	0	6	0	0	1
Brunswick	0	0		0	65	0	0	0	1	0	0	0
Savannah	0	0	3	2	3	2	3	0	0	0	0	0
EAST SOUTH CENTRAL												
Tennessee:												
Memphis	0	0	25	1	13	8	9	0	16	0	0	7
Nashville	1	0		1	0	2	3	0	10	0	0	0
Alabama:												
Birmingham	1	0	22	1	12	4	5	0	1	0	0	0
Mobile	1	0	3	3	7	1	2	0	1	0	0	0
WEST SOUTH CENTRAL												
Arkansas:												
Little Rock	0	0	12	0	22	0	2	0	1	0	0	2
Louisiana:												
New Orleans	6	0	44	2	24	3	8	0	2	0	0	1
Shreveport	1	0	----	0	0	1	9	0	1	0	1	0
Texas:												
Dallas	0	0	----	0	38	2	6	0	3	0	0	0
Galveston	0	0	22	0	2	0	1	0	0	0	0	0
Houston	5	0	----	3	10	1	10	0	1	0	0	0
San Antonio	0	0	8	5	25	3	9	0	0	0	0	2
MOUNTAIN												
Montana:												
Billings	0	0	----	0	4	0	0	0	2	0	0	1
Great Falls	0	0	24	0	13	0	1	0	7	0	0	0
Helena	0	0	----	0	6	0	0	0	0	0	0	0
Missoula	0	0	----	0	6	0	2	0	0	0	0	0
Idaho:												
Boise	0	0	----	0	1	0	0	1	1	0	0	0
Colorado:												
Denver	0	0	5	0	75	2	7	0	13	0	0	20
Pueblo	0	0	----	0	52	0	1	0	2	0	0	4
Utah:												
Salt Lake City	0	0	----	3	2	1	4	0	33	0	0	0

City reports for week ended February 19, 1944—Continued

	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
PACIFIC												
Washington:												
Seattle	0	0	------	0	10	2	8	1	33	0	0	7
Spokane	0	0	2	2	58	0	1	0	30	0	0	0
Tacoma	0	0	------	1	23	0	3	0	56	0	0	1
California:												
Los Angeles	5	0	35	5	124	8	11	1	39	0	0	7
Sacramento	1	0	----	0	3	0	2	0	0	0	0	2
San Francisco	1	0	21	1	25	7	7	2	28	0	0	8
Total	65	1	335	60	6,651	212	508	9	2,035	1	10	296
Corresponding week, 1943	70	3	309	41	4,594	146	566	8	1,551	0	10	906
Average, 1939–43	91	------	943	[1] 66	[2] 3,787	------	[1] 575	------	1,439	10	11	1,014

Dysentery, amebic.—Cases: Philadelphia, 1; New York, 1.
Dysentery, bacillary.—Cases: Providence, 1; New York, 18; Los Angeles, 2.
Dysentery, unspecified.—Cases: San Antonio, 4.
Leprosy.—Cases: New Orleans, 1, San Antonio, 4.
Tularemia.—Cases: New Orleans, 2, St Louis, 1.
Typhus fever.—Cases: Philadelphia, 1; Nashville, 1; Birmingham, 1, Wilmington, N. C., 1; Savannah, 1; New Orleans, 1.

[1] 3-year average, 1941–43.
[2] 5-year median.

Rates (annual basis) per 100,000 population, by geographic groups, for the 87 cities in the preceding table (estimated population, 1942, 34,581,000)

	Diphtheria case rates	Encephalitis, infectious, case rates	Influenza		Measles case rates	Meningitis, meningococcus, case rates	Pneumonia death rates	Poliomyelitis case rates	Scarlet fever case rates	Smallpox case rates	Typhoid and paratyphoid fever case rates	Whooping cough case rates
			Case rates	Death rates								
New England	7 5	0.0	7.5	0.0	994	47.3	107.1	0.0	538	2.5	0.0	85
Middle Atlantic	4 9	0 4	10.3	2.7	677	27.7	78.7	0.4	225	0.0	1.3	33
East North Central	8 2	0 0	10.0	6.4	923	25.2	41.6	1.2	289	0.0	2.3	50
West North Central	17 8	0.0	7.9	11.9	2816	45 6	111.1	0.0	454	0.0	4.0	50
South Atlantic	10.7	0.0	124.6	16.0	2115	35.6	90 8	1.8	562	0.0	0.0	39
East South Central	17 9	0.0	297.8	35 7	191	89 3	113.2	0 0	167	0.0	0.0	42
West South Central	35.3	0.0	238.2	29 4	356	29 4	132 3	0 0	24	0.0	0.3	15
Mountain	0 0	0.0	233 8	24 2	1282	24 2	120 9	8 1	468	0.0	0.0	202
Pacific	12 3	0.0	101 6	15 8	426	29 8	56.1	7 0	326	0 0	0.0	35
Total	9 8	0.2	50.7	9.1	1006	32 1	76 8	1.4	308	0.2	1.5	45

TERRITORIES AND POSSESSIONS

Hawaii Territory

Honolulu—Dengue fever.—During the first 15 days of February 1944, 37 cases of dengue fever were reported in Honolulu, T. H., bringing the total number of cases reported to date to 1,416. The increase in the number of cases reported in the last half of January continued during the first half of February.

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—Week ended February 5, 1944.—During the week ended February 5, 1944, cases of certain communicable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox		21		182	391	53	43	182	174	1,046
Diphtheria		15	6	37	5	1	1		1	66
Encephalitis, infectious					1					1
German measles		1		11	24	2	11	6	14	69
Influenza	14	85	6		107	3			85	300
Measles	2	38	1	403	620	60	73	234	10	1,441
Meningitis, meningococcus			1	1	7	1			1	11
Mumps	2	8		40	222	70	14	56	79	491
Poliomyelitis	1	1								2
Scarlet fever	1	9	6	85	215	69	31	68	80	564
Tuberculosis (all forms)		8	10	116	57	11	9	55	41	302
Typhoid and paratyphoid fever		1		6	1					8
Undulant fever				3	1					4
Whooping cough		17		96	150		27	20	39	349

FINLAND

Notifiable diseases—December 1943.—During the month of December 1943, cases of certain notifiable diseases were reported in Finland as follows:

Disease	Cases	Disease	Cases
Cerebrospinal meningitis	19	Mumps	269
Chickenpox	673	Paratyphoid fever	121
Conjunctivitis	21	Pneumonia (all forms)	1,984
Diphtheria	2,553	Poliomyelitis	16
Dysentery	3	Puerperal fever	43
Gastroenteritis	1,669	Rheumatic fever	294
Gonorrhea	524	Scabies	2,851
Hepatitis, epidemic	774	Scarlet fever	834
Influenza	1,236	Syphilis	359
Laryngitis	51	Typhoid fever	67
Lymphogranuloma inguinale	1	Vincent's infection	4
Measles	10,656	Whooping cough	625

MADAGASCAR

Cerebrospinal meningitis.—For the year 1943, 708 cases of cerebrospinal meningitis were reported in Madasgascar.

NEW ZEALAND

Notifiable diseases—4 weeks ended January 31, 1944.—During the 4 weeks ended January 31, 1944, certain diseases were reported in New Zealand as follows:

Disease	Cases	Deaths	Disease	Cases	Deaths
Actinomycosis	3	1	Poliomyelitis	20	3
Cerebrospinal meningitis	14	2	Puerperal fever	7	
Diphtheria	52	1	Scarlet fever	218	2
Dysentery (bacillary)	22		Tetanus	8	4
Erysipelas	19		Trachoma	1	
Food poisoning	19	1	Tuberculosis	213	74
Leprosy	1		Typhoid fever	10	
Ophthalmia neonatorum	2		Undulant fever	3	

SWEDEN

Notifiable diseases—September 1943.—During the month of September 1943, cases of certain notifiable diseases were reported in Sweden as follows:

Disease	Cases	Disease	Cases
Cerebrospinal meningitis	4	Poliomyelitis	406
Diphtheria	181	Scarlet fever	2, 640
Dysentery	263	Syphilis	91
Encephalitis, epidemic	1	Typhoid fever	5
Gonorrhea	2, 177	Undulant fever	5
Hepatitis	824	Weil's disease	9
Paratyphoid fever	25		

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

NOTE.—Except in cases of unusual prevalence, only those places are included which had not previously reported any of the above-named diseases, except yellow fever, during the current year. All reports of yellow fever are published currently.

A cumulative table showing the reported prevalence of these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday of each month.

(Few reports are available from the invaded countries of Europe and other nations in war zones.)

Plague

Egypt—Suez.—During the week ended February 5, 1944, 12 cases of plague with 4 deaths were reported in Suez, Egypt.

Madagascar.—Plague has been reported in Madagascar by quarters for the year 1943 as follows: First quarter, 124 cases, 110 deaths; second quarter, 21 cases, 19 deaths; third quarter, 13 cases, 13 deaths; fourth quarter, 76 cases, 67 deaths.

Morocco.—Plague has been reported in French Morocco as follows: For the month of November 1943, Casablanca, 1 case, rural section, 44 cases; for the month of January 1944, 1 case and 1 death in Casablanca; February 1–10, 1944, 1 case in Bourgogne district.

Peru.—For the month of December 1943, plague was reported in Peru, by Departments, as follows: Ancash, 2 cases; Ica, 1 case; Libertad, 9 cases, 3 deaths; Lima, 4 cases, 1 death; Piura, 6 cases.

Smallpox

Algeria.—For the period January 21–31, 1944, 68 cases of smallpox were reported in Algeria.

Belgian Congo.—Smallpox has been reported in Belgian Congo as follows: Weeks ended—December 18, 1943, 56 cases; December 25, 184 cases; January 1, 1944, 115 cases; January 8, 194 cases; January 15, 71 cases; January 22, 33 cases; January 29, 34 cases.

Egypt—Port Said.—During the week ended February 5, 1944, 28 cases of smallpox with 3 deaths were reported in Port Said, Egypt.

Greece.—Smallpox has been reported in Greece as follows: October 1943, 194 cases; November, 173 cases; December, 82 cases.

India—Calcutta.—Deaths from smallpox in Calcutta, India, have increased to 230 for the week ended February 5, 1944, as compared with 157 deaths for the week ended January 29, 1944.

Indochina.—For the period January 10–20, 1944, 147 cases of smallpox were reported in Indochina.

Mexico—Torreon.—For the week ended February 19, 1944, 11 cases of smallpox were reported in Torreon, Mexico.

Typhus Fever

Algeria.—For the period January 21–31, 1944, 41 cases of typhus fever were reported in Algeria.

Greece.—Typhus fever has been reported in Greece as follows: October 1943, 21 cases; November, 19 cases; December, 29 cases.

Rumania.—For the period February 8–15, 1944, 644 cases of typhus fever were reported in Rumania, including 8 cases in Bucharest.

Spain.—For the week ended January 22, 1944, 8 cases of typhus fever were reported in Spain.

Tunisia.—For the period January 21–31, 1944, 19 cases of typhus fever were reported in Tunisia.

FEDERAL SECURITY AGENCY

UNITED STATES PUBLIC HEALTH SERVICE

THOMAS PARRAN, *Surgeon General*

DIVISION OF PUBLIC HEALTH METHODS

G. ST. J. PERROTT, *Chief of Division*

THE PUBLIC HEALTH REPORTS, first published in 1878 under authority of an act of Congress of April 29 of that year, is issued weekly by the United States Public Health Service through the Division of Public Health Methods, pursuant to the following authority of law: United States Code, title 42, sections 7, 30, 93; title 44, section 220.

It contains (1) current information regarding the prevalence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

The PUBLIC HEALTH REPORTS is published primarily for distribution, in accordance with the law, to health officers, members of boards or departments of health, and other persons directly or indirectly engaged in public health work. Articles of special interest are issued as reprints or as supplements, in which forms they are made available for more economical and general distribution.

Requests for and communications regarding the PUBLIC HEALTH REPORTS, reprints, or supplements should be addressed to the Surgeon General, United States Public Health Service, Washington, D. C. Subscribers should remit direct to the Superintendent of Documents, Washington, D. C.

Librarians and others should preserve their copies for binding, as the Public Health Service is unable to supply the general demand for bound copies. Indexes will be supplied upon request.

UNITED STATES GOVERNMENT PRINTING OFFICE, WASHINGTON : 1944

For sale by the Superintendent of Documents, Washington 25, D. C.

Price 5 cents. Subscription price $2.50 a year

Public Health Reports

VOLUME 59 MARCH 17, 1944 NUMBER 11

IN THIS ISSUE

Problems Created by Returning Malaria Carriers

Sickness Absenteeism, Third Quarter of 1943

CONTENTS

Public Health Reports

Vol. 59 • MARCH 17, 1944 • *No. 11*

PROBLEMS CREATED BY RETURNING MALARIA CARRIERS[1]

By Stanley B. Freeborn, *Senior Surgeon (R), United States Public Health Service*

During the past year we have been exposed to a sample of what may be expected in the way of malaria carriers in the future when large numbers of troops return to this country from the fighting fronts. Already malaria is rated as the No. 1 disease by both Army and Navy. We are not at liberty to quote rates but some indication of the magnitude of the problem is gained by the statement that 75 percent of the malaria among troops in the Continental United States at this moment is of foreign origin. The rate among returning troops can be imagined from this figure when one considers the extremely small proportion of the troops now in the United States who have actually seen foreign service.

When one lists the important theatres of the war—the southwest Pacific, southeast Asia, India, and the eastern Mediterranean—he has noted all the most important malarial centers of the world, except equatorial Africa and tropical America, and even in these areas there are concentrations of troops and considerable military activity.

The very nature of military operations precludes the possibility of sound antimalarial precautions until the occupied areas have been consolidated to the extent that antianopheline measures become feasible.

It is true that enormous strides have been made in the development of effective repellents to protect against the bites, and in the use of aerosol sprays to keep down the numbers of infective mosquitoes in the shelters or quarters of troops that are in mobile units. In addition, the production of atabrine has reached a point where no shortage is probable, at least among the armed forces. Its effectiveness as a suppressive is well recognized, and it apparently controls *falciparum* (subtertian) malaria in some cases if taken in sufficiently large doses and far enough in advance of exposure to produce an adequate blood

[1] Presented at Health Officers' Section, California League of Municipalities, Sacramento, Calif.

level. Apparently, however, *vivax* (tertian) malaria breaks through the atabrine suppressive dosage quite consistently and almost invariably relapses as soon as atabrine consumption is stopped. Since tertian malaria is noted for its ability to relapse for months and even years after the initial attack, the management problem for these carriers is a complicated one. While absolutely necessary to keep troops on their feet during a campaign, the use of any drug developed thus far is useless in reducing the infection rate.

A recent report of a national committee on tropical diseases states: "Malaria infection rates have never been controlled by drugs. If malaria control is the proposed purpose of suppressive treatment, then it is not advisable. Treatment should be provided to control the death rate. Control of population movements or control of anophelines is necessary in the prevention of epidemics, but the endemic infection rate depends on separating the populations from constant contact with mosquitoes. This last can be done through screening, killing adult mosquitoes, or preventing the production of large numbers of anophelines. Wholesale suppressive treatment would only serve to increase the number of subclinical cases. It is much better to let attacks become apparent through frank paroxysm and then give full therapeutic medication."

No malariologist would quarrel with the proposal to control malaria with drugs or vaccines if an effective prophylactic were available. None has been produced, however, and in its absence the only time-tested recourse is the reduction of anopheline carriers. It is known from experience that the examination of a single blood smear will detect only from 20 to 50 percent of those infected. To hold all returning personnel over a period of 5 to 8 weeks in quarantine with weekly examinations of blood smears would probably result in the detection of perhaps 80 to 85 percent of those infected but the cost would be terrific and the results problematical.

If such a procedure were followed and the results showed that only 10 percent were harboring parasites, we would still be confronted by a serious dilemma as to what course to follow with those found to be positive. To keep that many men under surveillance or quarantine from 6 to 9 months, which would be the shortest time that could logically be established if such a procedure of quarantine were inaugurated, would cost enormous sums and create a resentment on the part of the troops and their families that could not be withstood by military or public health authorities.

To liberate them without plans and facilities to protect the communities to which they travel would be to subscribe to defeatism and would be little short of criminal negligence on the part of those charged with the protection of the public health. As a solution to this problem, Dr. L. L. Williams, Jr., of the United States Public Health Service,

has proposed an original and daring hypothesis—that of eradicating malaria from the United States. He proposes an antianopheline attack in the endemic areas that still persist and the activation of mobile antianopheline units to control the expected explosive epidemics that will occur in those areas outside the endemic foci where the introduction of new human carriers will overbalance the handicaps against the transmission of malaria in favor of transmission.

Before dismissing this proposal as idealistic and academic, as one is apt to do in visualizing the thousands of acres of anopheline breeding waters in the United States, let us look at the facts.

In 1880 malaria was endemic over the entire United States except the tip of New England, the crest of the Appalachians, and the semiarid West. Even in this last section, malaria was a problem in the Central Valley of California, the Willamette Valley of Oregon, and in some of the Mormon settlements of Utah. Malaria is not simply an association of a potent anopheline vector and human carriers despite the fact that these are absolutely necessary factors in the perpetuation of the disease. Potent anopheline vectors of malaria occur in every State in the Union. It is probable that there are also human carriers present in the same areas. However, malaria is now considered to be endemic in a relatively small proportion of the States in which it was an important disease in 1880.

The third factor to make up the triumvirate with anophelines and human carriers which makes malaria possible is a composite group of conditions which are included in a properly vague phrase which is known as the "ecological niche." Many of the factors which make up a favorable "ecological niche" are unknown. Others are very obvious as, for instance, temperature. Malaria is a disease of warm climates. This is apparent not only from its distribution but also from the optimum temperatures required for the development of the parasite in the body of the mosquito—71° F. for quartan malaria, 77° F. for tertian, and 86° F. for subtertian. Temperatures slightly below these points lengthen the period of development and if markedly lower inhibit the development completely. Obviously, a mosquito which succeeds in obtaining a meal of infective blood in cool northern Michigan would have a much smaller chance of becoming infective than an anopheline of the same species in hot, humid South Georgia.

Anophelines are also particularly susceptible to low relative humidities. This is particularly important in California. There is fairly good evidence that in the Central Valley the humidities in July and August are so low that the average length of life of anopheline females is materially shortened. It is sufficiently long to enable them to lay eggs and perpetuate the species but too short to develop the malaria parasite and transmit it, thus reducing transmission to the spring and early fall when the humidity is higher.

Added to these natural obstacles are those interposed by man. The advent of substantial housing and screening was probably the greatest accomplishment in reducing the malarial rate, as it interposed an effective barrier to prevent mosquitoes from becoming infected and from passing the infection on to nonimmunes. In recent years when the relative amount of screening has not been increasing at the rate that it did when first introduced, the greatest aid in reducing the malaria rate has doubtless been the "flit" gun and pyrethrum sprays. As far as numbers of mosquitoes eliminated by this method are concerned, they are probably comparable to the numbers that we eliminate as larvae by dipping in suspected waters to determine the breeding rate. However, the mosquitoes killed by household spraying are the important ones as they are the ones that either have bitten or will bite human beings.

As far as can be determined, none of the anophelines that carry malaria in the United States are inordinately fond of human blood. They are easily deviated, to use a term of Hackett's, to other hosts such as cows, horses, and other domesticated or wild animals. They are totally unlike *A. gambiae*, the world's most serious malaria carrier, which was introduced into Brazil some years ago from equatorial Africa, or *Aedes aegypti*, the predominant yellow fever and dengue carrier, which prefer human blood to all others and choose inhabited human domiciles above all other available shelters.

Precipitin tests to determine the source of blood meals which show 5 percent of local anophelines as having fed on human blood are high. With *gambiae* or *aegypti*, rates of 80 percent are not unexpected.

If, therefore, only 5 percent have imbibed human blood, or one in twenty, provided that the group is homozygous in its catholicity of taste, the chances for one mosquito that has obtained one meal of human blood to obtain a second one in two meals would be one in four hundred. Assuming that all the ecological hurdles of temperature, humidity, and access to carriers in proper shape to infect the mosquitoes and to nonimmunes ready to be infected are surmounted, the mathematical chances of a successful transmission are then in odds of one to several thousand when it is considered that the human carrier rate in even the endemic areas of the United States is now only about one person in five hundred.

I have gone into some detail to enlarge on the difficulties of transmission because I believe a thorough appreciation of these points will explain why malaria has receded to its present endemic foci, why an eradication program is feasible, and why, if proper precautions are taken, there need be little fear of malaria epidemics as a result of returning carriers from the theatres of war.

At the present time, the endemic foci of malaria are limited to the southeastern portion of the United States in an area roughly bounded

by the latitude of Washington, D. C., and the longitude of San Antonio. Low grade endemicity occurs outside this area in the Pecos Valley of New Mexico, the Central Valley of California, the Willamette Valley of Oregon, and in scattered spots along the Ohio Valley.

The malaria rate in the southeast has been cyclic in character in peaks roughly 7 years apart. In 1932–33, which was an all-time low at that time, a blood smear survey of 129,000 school children showed a positive rate of 5.8 percent, or about one in twenty infected. This residual infection rate with the mosquito densities and ecological conditions as they were in 1934–35 was sufficient to produce an upswing in the rate which produced a peak which, in turn, started to recede in 1934. The expected 7-year peak did not materialize in 1941 but continued to recede. A survey of school children in 1942 comprising 109,000 slides so far examined and which covered much the same territory now shows a rate of 0.21 percent, or one in five hundred.

If anopheline densities and ecological conditions remain the same, at some stage in the recession of malaria carriers the critical point will be reached when the mathematical chances for a mosquito actually to transmit malaria will become so slight that fewer and fewer cases will develop and the disease will disappear for lack of carriers.

However, there are about 100 counties located in 12 States of the Southeast where the mortality rates exceed 30 per 100,000 per annum. It is obvious that with rates this high the mosquito densities and the ecological conditions are of such character that the disease is still able to perpetuate itself. The introduction of a few human carriers here, particularly if they harbor new strains of malaria from foreign shores for which the native population has no tolerance, will unquestionably produce an increase in the rate. By the same token, in the countries where malaria is waging a losing battle at the present moment by virtue of a lack of carriers, the introduction of fresh sources of infection is bound to counterbalance the decrease in mosquitoes or improved housing that has been responsible for the previous decrease and produce an unwelcome increase in the number of cases.

The perpetuation of malaria and its degree of endemicity is a meticulously balanced relationship between mosquito vectors, human carriers, and the ecological conditions under which they operate.

Dr. Williams' proposal to control by means of antianopheline measures the centers of easiest transmission (the present endemic foci) and to be ready to suppress by antianopheline measures the explosive epidemics outside the recognized endemic foci is a sound philosophy and good public health procedure.

Properly activated and progressively motivated, the impact of returning carriers could be offset by a reduction in mosquito vectors in the areas where the balance appeared to be turning against us so

that, instead of increasing, the national malaria rate would continue to recede to the point of eradication.

The Public Health Service has been given a mandate for the prosecution of at least a portion of this suggested proposal of Dr. Williams. At present antianopheline programs are being carried on with the cooperation of 20 States, the District of Columbia, and Puerto Rico. In addition, 12 city programs for the prevention of yellow fever and dengue are being carried on in 5 States and the Territory of Hawaii.

The antimalaria programs are centered about war areas, i. e., Army and Navy establishments, critical war industries, and congregating, recreational, or housing areas for service men. Originally intended to protect the military forces from the malaria hazards incident to the areas where they were quartered, the program is on the point of reversing itself at the present moment into an attempt not only to fulfill its original purpose but to prevent an increase in the civilian malaria rate as a result of the returning malaria carriers from overseas.

The frank, recognized cases of malaria and the malaria cases that are concurrent with other causes of hospitalization will be quartered in general hospitals throughout the country. These cases will be of little danger to the community as long standing experience of both the Army and Navy has established well regulated regimes of treatment and screening that should obviate most of the danger of transmission.

However, because there will be comparatively heavy concentrations of potential carriers at all general hospitals, their sites have all been surveyed and if effective mosquito carriers are present they are being kept under inspection and control operations inaugurated when and if the densities become even moderately serious.

The prisoner-of-war camps furnish a more serious complication. The rate of infection is relatively high and, even though they are receiving excellent medical attention, the possibilities for them to transmit infection to the countryside in their roles as agricultural workers is much greater than in the case of the hospitalized patient. As in the case of the general hospitals, the prisoner-of-war camps are being surveyed and the same precautions taken.

Far more serious than either of these categories is the case of the apparently healthy members of the armed forces who return to this country for a rest period or eventually for discharge. The release from atabrine treatment, coupled with a change of climate, a different daily routine, or possibly an overindulgence, even if it is only in mother's cooking, will combine to bring a relapse or even sometimes a primary attack which has remained latent. These men become the most dangerous carriers because they are seldom under close

medical observation and they may be scattered to the very last crossroad in the country on furlough.

At this point, the degree of vigilance of the local, county, and State health authorities will decide how serious the establishment of each small focus of infection is to become. In many cases the possibilities of transmission may be so slight, even though potent anophelines are present, that the case will remain unique. However, if transmission does ensue, the more quickly steps are taken, the smaller the chances for the establishment of a troublesome focus. An explosive epidemic of 53 cases this summer in an area where transmission is not easy was abated after the advent of an antimosquito and interior spraying program.

In addition to our established program, the Malaria Control in War Areas program has already taken steps to establish a skeleton team of entomologists and engineers in all the Public Health Service districts not included in our regular program. The principal function of these units will be to survey, inspect, and institute control if necessary in the vicinity of general hospitals, prisoner-of-war camps, and other stations where concentrations of malaria carriers are present. These units will have available one or more mobile control units equipped to inaugurate antianopheline measures designed to decrease breeding and for interior spraying to destroy adults. They will be available at the request of the State to the Public Health Service district office to work under the State's direction for the suppression of localized epidemics wherever they may occur.

SICKNESS ABSENTEEISM AMONG INDUSTRIAL WORKERS THIRD QUARTER OF 1943[1]

By W. M. GAFAFER, *Principal Statistician, United States Public Health Service*

The data on the frequency of sickness and nonindustrial injuries causing disability for more than 1 week during the third quarter and the first 9 months of 1943 and 1942, presented in table 1, are derived from analyses of periodic reports from industrial sick benefit associations, group insurance plans, and company relief departments. The group reported upon comprises over 250,000 workers.

THIRD QUARTER OF 1943

A comparison of the rates for the third quarter of 1943 with the corresponding ones for 1942 shows with only a few exceptions an increase for each cause. The number of absences of 8 days or longer on account

[1] From the Industrial Hygiene Division. The report on the second quarter appeared in Public Health Reports, 58:1885–1888 (Dec. 24, 1943).

of sickness and nonindustrial injuries for 1943 is 107.8 per 1,000 males which is 15 percent higher than the rate for 1942 (93.4). The respiratory, the digestive, and the nonrespiratory-nondigestive disease groups show increases of 18, 10, and 16 percent, respectively.

Attention is also directed to the increases shown by bronchitis (31 percent), diseases of the stomach except cancer (29 percent), and diseases of the heart and arteries, and nephritis (50 percent).

TABLE 1.—*Average annual number of absences on account of sickness and nonindustrial injuries disabling for 8 consecutive calendar days or longer among* MALE *employees in various industries, by cause, the third quarter of 1943 compared with the third quarter of 1942, and the first 9 months of 1943 compared with the first 9 months of the years 1938–42, inclusive*

Cause. (Numbers in parentheses are disease title numbers from the International List of Causes of Death, 1939)	Annual number of absences per 1,000 males				
	Third quarter		First 9 months		
	1943	1942	1943	1942	1938–42
Sickness and nonindustrial injuries [1]	107.8	93.4	132.7	104.6	98.4
Nonindustrial injuries (169–195)	12.7	12.5	12.2	11.8	11.4
Sickness	95.1	80.9	120.5	92.8	87.0
Respiratory diseases	31.4	27.5	61.3	39.1	38.0
Tuberculosis of the respiratory system (13)	.8	.8	.8	.7	.8
Influenza, grippe (33)	8.8	8.2	23.2	14.5	16.9
Bronchitis, acute and chronic (106)	6.3	4.8	10.6	6.3	5.2
Pneumonia, all forms (107–109)	3.3	3.1	9.4	5.1	3.8
Diseases of the pharnyx and tonsils (115b, 115c)	5.1	4.7	7.2	5.4	5.3
Other respiratory diseases (104, 105, 110–114)	7.1	5.9	10.1	7.1	6.0
Digestive diseases	19.4	17.7	16.8	16.6	15.1
Diseases of the stomach except cancer (117, 118)	6.6	5.1	5.7	4.7	4.1
Diarrhea and enteritis (120)	2.8	2.6	2.0	1.9	1.5
Appendicitis (121)	5.2	4.9	4.4	5.2	4.9
Hernia (122a)	1.9	1.9	1.9	1.8	1.7
Other digestive diseases (115a, 115d, 116, 122b–129)	*2.9*	*3.2*	*2.8*	*3.0*	*2.9*
Nonrespiratory-nondigestive diseases	39.2	33.8	38.1	35.0	31.6
Infectious and parasitic diseases (1–12, 14–24, 26–29, 31, 32, 34–44) [2]	2.1	1.9	2.7	2.7	2.4
Rheumatism, acute and chronic (58, 59)	4.6	3.8	4.7	4.0	4.0
Neurasthenia and the like (part of 84d)	1.8	1.3	1.5	1.1	1.0
Neuralgia, neuritis, sciatica (87b)	2.8	1.9	2.8	2.2	2.2
Other diseases of the nervous system (80–85, 87, except part of 84d, and 87b)	1.7	1.2	1.5	1.2	1.2
Diseases of the heart and arteries, and nephritis (90–99, 102, 130–132)	5.4	3.6	5.4	4.4	4.3
Other diseases of the genitourinary system (133–138)	2.9	2.5	2.7	2.5	2.5
Diseases of the skin (151–153)	3.9	3.9	3.2	3.0	2.9
Diseases of the organs of movement except diseases of the joints (156b)	3.5	2.7	3.6	3.0	2.8
All other diseases (45–57, 60–79, 88, 89, 100, 101, 103, 154, 155, 156a, 157, 162)	10.5	11.0	10.0	10.9	8.3
Ill-defined and unknown causes (200)	5.1	1.9	4.3	2.1	2.3
Average number of males covered in the record	273,151	263,008	270,915	258,021	1,026,254
Number of organizations	18	21	21	21	---------

[1] Industrial injuries, venereal diseases, and a few numerically unimportant causes of disability are not reported.
[2] Except influenza and grippe, respiratory tuberculosis, and the venereal diseases.

THIRD QUARTERS, 1934–43

Broad cause groups.—Figure 1 presents the variation over the 10-year period 1934–43 of the contribution of each of the three broad cause groups to the varying total sickness rate. The varying total sickness rate (shown three times in the figure) reveals an upward trend since
the 10 third-quarter rates is 68.4 and when the yearly

rates are related to this mean only three excesses arise, namely, excesses of 6, 18, and 39 percent for the years 1941, 1942, and 1943, respectively.

The contributions made by the respiratory group of diseases to the total sickness rate are also of considerable interest. The 10 respiratory rates yield a mean of 20.3. Prior to 1940 each of the yearly rates is below the mean; in 1940 and thereafter the yearly rates show excesses that increase in magnitude. These excesses covering 1940 through 1943 are 4, 11, 35, and 55 percent, respectively. The only excesses presented by the digestive group of diseases occur in the 3 years 1941 through 1943; these excesses are 8, 16, and 27 percent, respectively, the mean rate being 15.3. In the instance of the nonrespiratory-nondigestive group of diseases yielding a mean of 30.0 there are only

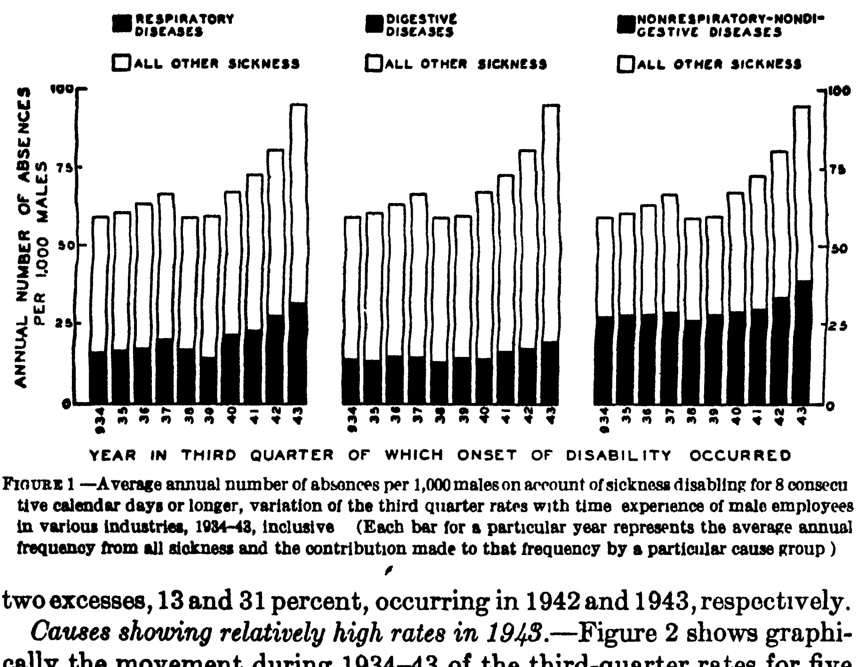


FIGURE 1.—Average annual number of absences per 1,000 males on account of sickness disabling for 8 consecutive calendar days or longer, variation of the third quarter rates with time experience of male employees in various industries, 1934–43, inclusive (Each bar for a particular year represents the average annual frequency from all sickness and the contribution made to that frequency by a particular cause group.)

two excesses, 13 and 31 percent, occurring in 1942 and 1943, respectively.

Causes showing relatively high rates in 1943.—Figure 2 shows graphically the movement during 1934–43 of the third-quarter rates for five causes: rheumatic diseases (rheumatism, acute and chronic; neuralgia, neuritis, and sciatica; and diseases of the organs of movement except diseases of the joints); diseases of the stomach except cancer; diseases of the heart and arteries, and nephritis; bronchitis, acute and chronic; and nervous diseases (neurasthenia and the like, and "other diseases of the nervous system").

It will be observed that each of the five causes shows a third-quarter rate for 1943 that has never been equalled or exceeded during the 10-year period. When the 1943 third-quarter rate for each of the five causes is related to the appropriate mean rate for the 10 years, certain

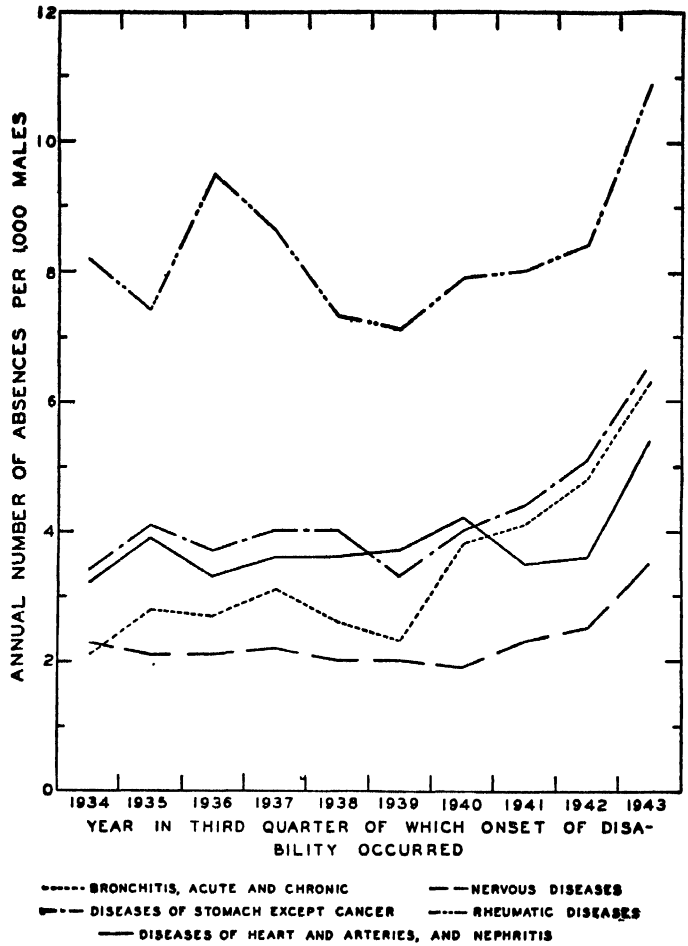


FIGURE 2.—Average annual number of absences per 1,000 males on account of selected causes disabling for 8 consecutive calendar days or longer, variation of the third-quarter rates with time; experience of male employees in various industries, 1934–43, inclusive. (The rheumatic diseases include rheumatism, acute and chronic; neuralgia, neuritis, and sciatica; and diseases of the organs of movement except diseases of the joints. The nervous diseases include neurasthenia and the like, and "other diseases of the nervous system.")

percentage excesses emerge. These excesses, together with the corresponding 10-year means, are presented in the following table:

Cause	Number of absences per 1,000 males (mean of 10 third quarters, 1934–43)	Percent the third-quarter rate for 1943 is above the mean for 1934–43
Rheumatic diseases	8.3	31
Diseases of the stomach except cancer	4.3	53
Diseases of the heart and arteries, and nephritis	3.8	42
Bronchitis, acute and chronic	3.5	80
Nervous diseases	2.3	52

Thus the 1943 rate for bronchitis is 80 percent above the 10-year mean of 3.5.

It is of interest to observe in figure 2 that each of the five causes shows an upward trend since 1941, a spectacular change in each instance being precipitated by the 1943 rate. The rates for three causes moved upward since 1939: rheumatic diseases, diseases of the stomach, and bronchitis. The nervous diseases are on a level trend to 1940 and thereafter the movement is upward. Diseases of the heart and arteries, and nephritis show a minimum rate in 1941, a slight elevation in 1942, and a 50 percent increase from 1942 to 1943.

These extraordinary changes in rate occurred during the defense and war programs of the Nation. As indicated elsewhere,[2] the underlying causes effecting these changes are probably related to certain factors among which are the increased employment of youth and of the older worker; the hiring of workers long unemployed, inexperienced workers, and many persons excluded from the armed forces for some reason or another; green authority; overcrowding in the plant; the migration of workers, particularly from the country to the city; and the associated multitudinous changes in working, home, and community conditions.

PREVALENCE OF COMMUNICABLE DISEASES IN THE UNITED STATES

January 30–February 26, 1944

The accompanying table summarizes the prevalence of nine important communicable diseases, based on weekly telegraphic reports from State health departments. The reports from each State are published in the PUBLIC HEALTH REPORTS under the section "Prevalence of disease." The table gives the number of cases of these diseases for the 4 weeks ended February 26, 1944, the number reported for the corresponding period in 1943, and the median number for the years 1939–43.

DISEASES ABOVE MEDIAN PREVALENCE

Scarlet fever.—Each geographic area reported an increase in the incidence of scarlet fever during the 4 weeks ended February 26 over the preceding 4-week period. While the largest numbers of cases were reported from the Middle Atlantic and North Central regions, the greatest percentage increase over the seasonal expectancy was reported from the Pacific and South Atlantic regions. In the Pacific region the number of cases (2,659) was more than 3 times the 1939–43 median, while in the South Atlantic region the number (2,460) was 2.2 times

[2] Manual of Industrial Hygiene and Medical Service in War Industries. W. B. Saunders Company, Philadelphia, 1943. p. 420.

the median. In other regions the excesses over the median expectancy ranged from 10 percent in both the East North Central and East South Central regions to 50 percent in the New England section. For the country as a whole the number of cases totaled 23,362 as compared with 16,265 for this period in 1943, which figure also represents the preceding 5-year median. The current incidence is the highest for this period since 1938. The increase of the current 4-week period over the preceding period was about 37 percent, while the corresponding increase of this period in each of the two preceding years over immediately preceding periods was only about 15 percent.

Meningococcus meningitis.—The number of cases of this disease was slightly lower than the number reported during the preceding 4-week period. Three States, Ohio (117 cases), Michigan (114), and Illinois (111), all in the East North Central area, reported an unusually high incidence. Other States reporting a relatively high incidence were in widely scattered areas; New York reported 244 cases, California 183, Pennsylvania 136, Tennessee 104, Virginia and Texas 94 each, and Missouri 90 cases. This disease is usually increasing at this season of the year, so the decline from the preceding 4-week period, although slight, is significant. During this period in 1943 the number of cases increased 30 percent over its preceding period, and the average increase during this period over the preceding period is about 22 percent for the past 5 years. However, the actual incidence was high. For the country as a whole the number of cases (2,214) was 1.3 times last year's figure which was also high, and about 10 times the 1939–43 median for this period. In the nine geographic regions the excess cases ranged from 3 times the median in the Mountain section to 23 times the median in the Pacific region.

Measles.—The number of reported cases of measles rose from approximately 50,000 during the preceding 4-week period to nearly 92,000 during the current 4 weeks. The incidence was more than 50 percent above the 1939–43 median, which was represented by the 1943 figure (60,335 cases). An increase of this disease is expected at this season of the year, but the rate of increase over the preceding 4-week period was 85 percent, while the increases in the 2 preceding years over their preceding periods were about 70 percent. The rate was about the same, however, as in other recent years when the disease reached an unusually high incidence (1938 and 1941). In the Pacific region the number of cases was only about 55 percent of the median, but in all other regions the incidence was relatively high; the largest increase over the median occurred in the East North Central section, and the smallest in the Mountain region.

Typhoid and paratyphoid fever.—For the 4 weeks ended February 26 there were 398 cases of these diseases reported, as compared with 208 for the corresponding period in 1943 and a 5-year median of

292 cases. Of the total, 174 cases of typhoid fever were reported from Indiana. An interesting outbreak which involved nine counties in the north central part of the State was caused by a carrier transporting food by automobile, the contaminated food being either cottage or cheddar cheese. The incidence dropped from a maximum of 70 cases during the week ended February 5 to 12 cases during the week ended February 26. In other regions of the country the incidence either closely approximated the 5-year median or fell considerably below it.

Influenza.—The number of reported cases of influenza dropped from 261,481 during the 4 weeks ended January 29 to 39,274 during the current 4-week period. From a maximum of 126,488 cases reported during the last week in December 1943, the number declined to 6,425 for the week ended February 26, 1944. Compared with preceding years, the number of cases reported for the current 4-week period was 2.1 times the number reported for the corresponding period in 1943 and 1.6 times the 1939–43 median. In each geographic area except the Middle Atlantic and East and West North Central the incidence was considerably above the normal seasonal expectancy.

In the 90 cities included in the Census Bureau's Weekly Health Index the deaths from all causes reached a maximum of 14,262 during the last week of December and declined to 9,591 deaths for the week ended February 26, a figure approximately the same as the preceding 3-year average for this week.

DISEASES BELOW MEDIAN PREVALENCE

Diphtheria.—The number of cases (972) of diphtheria reported for the 4 weeks ended February 26 was only about 80 percent of the median seasonal expectancy (approximately 1,200 cases). In the New England and Pacific regions the numbers of cases were slightly above the 1939–43 median, but in all other regions the incidence was relatively low. While the number of cases (33) reported from the New England region was not large, it was the highest incidence in that region in 5 years. For the country as a whole the number of cases was the lowest on record for this period of the year.

Poliomyelitis.—This disease stood approximately at the 1943 level and the number of cases (90) was about 10 percent below the 1939–43 median. California reported 22 cases, Washington 9, Texas 7, and New York 5, but no other State reported more than 4 cases. The incidence in the Pacific region (34 cases) was the highest since 1935, when 46 cases were reported for this period.

Smallpox.—The incidence of smallpox continued at a low level. There were 53 cases reported during the current 4 weeks, as compared with 102 for the corresponding period in 1943 and a preceding 5-year median of 188 cases. In the Pacific region 7 cases were

reported as compared with a median of 1 case; the North and South Central regions reported significant decreases from the median figures, and few or no cases occurred elsewhere.

Whooping cough.—There were 7,396 cases of whooping cough reported for the 4-week period ended February 26. The number was less than 50 percent of the number reported for the corresponding period in 1943 and also of the 1939–43 median. In each region the incidence was considerably below that of 1943, and in each region except the West South Central the number of cases was considerably below the 1939–43 median.

MORTALITY, ALL CAUSES

The average weekly number of deaths from all causes in large cities as reported by the Bureau of the Census for the 4 weeks ended

Number of reported cases of 9 communicable diseases in the United States during the 4-week period January 30–February 26, 1944, the number for the corresponding period in 1943, and the median number of cases reported for the corresponding period, 1939–43

Division	Current period	1943	5-year median	Current period	1943	5-year median	Current period	1943	5-year median
	Diphtheria			Influenza [1]			Measles [2]		
United States	972	1,125	1,171	39,274	18,933	23,994	91,984	60,335	60,335
New England	33	18	23	234	32	57	5,527	5,731	4,084
Middle Atlantic	77	116	191	167	118	285	19,096	21,714	7,860
East North Central	160	133	195	1,509	477	5,016	27,676	7,455	5,799
West North Central	91	97	104	473	235	793	10,081	4,196	4,196
South Atlantic	138	163	237	10,615	6,738	9,184	14,809	2,476	7,041
East South Central	69	106	125	3,803	1,372	2,825	3,236	3,578	1,494
West South Central	232	247	247	17,134	7,853	9,254	4,282	2,785	2,117
Mountain	49	89	86	4,077	1,566	1,566	3,403	5,233	3,215
Pacific	123	156	115	1,262	542	634	3,874	7,167	7,167
	Meningococcus meningitis			Poliomyelitis			Scarlet fever		
United States	2,214	1,677	227	90	92	101	23,362	16,265	16,265
New England	129	203	13	2	0	2	2,344	2,602	1,539
Middle Atlantic	455	361	51	6	8	8	4,778	3,798	3,945
East North Central	421	151	19	5	9	17	5,435	4,181	4,801
West North Central	177	102	13	5	12	10	2,984	1,602	1,796
South Atlantic	327	363	45	10	14	14	2,460	1,159	1,127
East South Central	261	128	43	7	9	12	772	596	687
West South Central	184	94	22	15	11	11	546	454	439
Mountain	33	53	11	6	8	6	1,384	1,008	647
Pacific	227	222	10	34	21	10	2,659	865	865
	Smallpox			Typhoid and paratyphoid fever			Whooping cough [2]		
United States	53	102	188	398	208	292	7,396	15,061	15,121
New England	0	0	0	9	7	12	597	1,293	1,293
Middle Atlantic	0	0	0	36	33	46	1,273	3,307	3,325
East North Central	16	39	47	207	28	39	1,473	3,549	3,549
West North Central	5	17	77	8	11	15	515	729	669
South Atlantic	4	2	3	43	43	46	1,469	2,001	2,001
East South Central	6	4	13	24	21	26	397	587	580
West South Central	12	36	36	50	38	46	658	1,856	610
Mountain	3	4	17	8	11	13	430	469	769
Pacific	7	0	1	13	16	21	584	1,270	1,270

[1] Mississippi and New York excluded, New York City included.
[2] Mississippi excluded.

February 26 was 9,543, as compared with 9,659 for the corresponding weeks in the 3 preceding years—a decrease of about 1.2 percent. During the period of the influenza epidemic the deaths reached the high level of approximately 12,000 per week. During the weeks ended February 5 and 12, 1944, the number of deaths fell below the 3-year average for the first time since September 1942; during the third and fourth weeks of this 4-week period the deaths stood at about the level of the 3-year average.

DEATHS DURING WEEK ENDED MARCH 4, 1944

[From the Weekly Mortality Index, issued by the Bureau of the Census, Department of Commerce]

	Week ended Mar. 4, 1944	Corresponding week, 1943
Data for 89 large cities of the United States:		
Total deaths	9,710	9,699
Average for 3 prior years	9,381	
Total deaths, first 9 weeks of year	92,813	91,360
Deaths under 1 year of age	598	728
Average for 3 prior years	643	
Deaths under 1 year of age, first 9 weeks of year	5,594	6,477
Data from industrial insurance companies:		
Policies in force	66,338,603	65,427,448
Number of death claims	14,433	14,224
Death claims per 1,000 policies in force, annual rate	11.4	11.3
Death claims per 1,000 policies, first 9 weeks of year, annual rate	11.6	10.7

PREVALENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED MARCH 11, 1944

Summary

For the first time this year the weekly incidence of meningococcus meningitis was lower than for the corresponding week last year. A total of 517 cases was reported currently as compared with 586 last week, 525 for the corresponding week last year, and 55 for the 5-year (1939–43) median. Decreases occurred in 6 of the 9 geographic divisions. Slight increases were reported in the Middle Atlantic, East South Central, and Mountain sections. A total of 5,590 cases has been reported to date this year, as compared with 4,040 for the same period last year, and a 5-year (1939–43) median of 533 cases.

States reporting 20 or more cases currently (last week's figures in parentheses) are as follows: *Increases*—New York 67 (65), Pennsylvania 40 (32), Michigan 28 (22), Mississippi 23 (7), Texas 20 (12); *decreases*—Ohio 26 (27), Illinois 29 (46), Missouri 20 (26), Tennessee 26 (29), California 32 (44).

A total of 6,945 cases of scarlet fever was reported for the week, a slight decrease from last week's total of 6,985. The 5-year median is 5,024. The total to date is 54,358, as compared with 38,235 for the same period last year.

Nineteen cases of poliomyelitis and 12 cases of smallpox were reported, as compared with 15 and 11, respectively, for last week. Decreased incidence was recorded for diphtheria, influenza, measles, typhoid fever, and whooping cough. The current figure for measles, however, is about 46 percent above the corresponding 5-year median.

A total of 9,526 deaths was recorded for the current week in 92 large cities of the United States, as compared with 9,834 last week, and 9,685 for a 3-year (1941–43) average. The cumulative total to date this year is 103,505, as compared with 102,388 for the same period last year.

Telegraphic morbidity reports from State health officers for the week ended March 11, 1944, and comparison with corresponding week of 1943 and 5-year median

In these tables a zero indicates a definite report, while leaders imply that, although none was reported, cases may have occurred.

Division and State	Diphtheria			Influenza			Measles			Meningitis, meningococcus		
	Week ended—		Median 1939–43	Week ended—		Median 1939–43	Week ended—		Median 1939–43	Week ended—		Median 1939–43
	Mar. 11, 1944	Mar. 13, 1943		Mar. 11, 1944	Mar. 13, 1943		Mar. 11, 1944	Mar. 13, 1943		Mar. 11, 1944	Mar. 13, 1943	
NEW ENGLAND												
Maine	0	0	0	------	2	2	256	3	205	2	7	1
New Hampshire	0	0	0	------	------	------	0	18	21	0	0	0
Vermont	1	0	0	------	------	------	121	372	17	1	1	0
Massachusetts	8	0	2	------	------	------	536	1,243	615	8	29	2
Rhode Island	0	0	0	21	17	------	381	38	38	5	11	0
Connecticut	4	0	1	6	3	9	522	443	307	12	8	0
MIDDLE ATLANTIC												
New York	14	19	26	[1] 9	[1] 12	[1] 40	2,659	1,941	1,482	67	57	7
New Jersey	1	3	6	9	9	14	1,497	1,417	384	18	21	1
Pennsylvania	9	4	14	3	2	------	1,323	2,709	925	40	26	8
EAST NORTH CENTRAL												
Ohio	8	10	17	19	7	21	3,115	450	299	26	11	2
Indiana	3	5	9	12	1	52	222	342	71	12	8	1
Illinois	7	14	17	21	34	34	1,115	887	505	29	16	2
Michigan [2]	4	5	5	6	8	28	1,703	630	373	28	12	2
Wisconsin	3	1	1	113	41	175	1,919	1,053	781	9	11	0
WEST NORTH CENTRAL												
Minnesota	5	5	1	3	------	4	1,658	45	240	7	5	0
Iowa	9	2	3	6	1	28	244	329	323	0	0	0
Missouri	4	2	6	5	7	8	365	467	86	20	15	0
North Dakota	0	0	1	13	------	30	184	102	102	0	0	0
South Dakota	4	3	1	7	------	1	116	152	11	0	3	0
Nebraska	4	3	2	4	3	7	153	292	38	2	1	1
Kansas	5	4	4	6	17	21	746	374	460	8	1	1
SOUTH ATLANTIC												
Delaware	0	0	0	------	------	------	22	54	7	1	2	0
Maryland [3]	6	6	2	7	10	53	1,295	73	104	13	18	2
District of Columbia	1	0	0	11	1	2	150	72	[illegible]	4	2	1
Virginia	5	10	12	510	696	1,016	1,087	650	424	17	29	3
West Virginia	4	1	7	19	9	71	342	13	15	9	6	2
North Carolina	8	8	13	14	137	135	1,650	58	649	10	16	1
South Carolina	14	1	4	507	1,017	958	330	59	59	11	13	2
Georgia	6	1	5	62	181	267	777	108	192	6	9	0
Florida	1	1	2	10	3	10	215	48	137	3	10	1
EAST SOUTH CENTRAL												
Kentucky	2	4	9	159	12	80	95	1,433	102	11	15	1
Tennessee	7	8	5	163	155	261	405	330	118	26	17	1
Alabama	1	6	8	133	212	401	549	132	174	6	10	1
Mississippi [3]	9	4	5	------	------	------	------	------	------	23	12	2
WEST SOUTH CENTRAL												
Arkansas	6	4	5	147	94	501	248	72	72	4	2	0
Louisiana	3	2	4	314	11	42	210	206	136	5	13	2
Oklahoma	3	3	5	107	49	253	102	36	36	3	7	1
Texas	26	40	38	1,538	1,653	1,167	1,679	1,261	767	20	23	2
MOUNTAIN												
Montana	0	0	0	9	14	19	172	204	80	0	2	0
Idaho	1	0	0	------	3	2	86	139	59	2	3	2
Wyoming	1	0	0	2	14	10	27	192	48	1	0	0
Colorado	7	6	6	40	42	61	479	622	213	2	2	0
New Mexico	1	1	1	12	2	3	50	13	27	0	0	0
Arizona	0	2	2	142	123	182	473	47	47	2	·1	0
Utah [3]	0	0	1	110	29	9	26	357	178	1	5	0
Nevada	0	0	0	5	------	------	0	25	0	0	7	0
PACIFIC												
Washington	2	2	3	9	------	3	180	845	560	8	14	0
Oregon	3	0	1	42	27	40	97	434	418	3	8	0
California	19	16	20	104	86	148	1,598	721	721	32	36	3
Total	229	201	340	4,439	4,744	7,725	31,179	21,511	21,373	517	525	55
10 weeks	2,511	2,951	3,249	310,953	45,417	69,182	207,252	136,443	136,091	5,590	4,040	533

See footnotes at end of table.

Telegraphic morbidity reports from State health officers for the week ended March 11, 1944, and comparison with corresponding week of 1943 and 5-year median—Continued

Division and State	Poliomyelitis			Scarlet fever			Smallpox			Typhoid and paratyphoid fever [4]		
	Week ended—		Median 1939–43	Week ended—		Median 1939–43	Week ended—		Median 1939–43	Week ended—		Median 1939–43
	Mar. 11, 1944	Mar. 13, 1943		Mar. 11, 1944	Mar. 13, 1943		Mar. 11, 1944	Mar. 13, 1943		Mar. 11, 1944	Mar. 13, 1943	
NEW ENGLAND												
Maine	0	0	0	20	18	18	0	0	0	0	0	0
New Hampshire	0	0	0	17	5	7	0	0	0	0	0	0
Vermont	0	0	0	12	5	5	0	0	0	0	0	0
Massachusetts	0	2	0	420	439	219	0	0	0	1	0	1
Rhode Island	0	0	0	18	28	15	0	0	0	0	0	0
Connecticut	0	0	0	110	81	69	0	0	0	1	2	1
MIDDLE ATLANTIC												
New York	2	0	0	616	491	536	0	0	0	6	5	4
New Jersey	0	0	0	261	161	208	0	0	0	0	0	2
Pennsylvania	0	2	1	637	346	430	0	0	0	3	2	7
EAST NORTH CENTRAL												
Ohio	1	2	1	404	248	397	0	4	0	2	2	3
Indiana	0	0	0	184	114	161	1	4	2	3	1	1
Illinois	0	0	1	447	218	448	0	1	3	1	0	2
Michigan [3]	0	0	0	276	192	299	0	0	0	1	3	3
Wisconsin	1	0	0	369	323	170	0	0	2	0	0	0
WEST NORTH CENTRAL												
Minnesota	0	0	0	193	87	87	0	0	6	0	0	0
Iowa	0	1	0	233	67	65	3	0	4	1	1	1
Missouri	0	0	0	113	148	123	0	0	2	0	0	2
North Dakota	0	0	0	55	16	16	0	0	0	0	0	0
South Dakota	0	0	0	40	22	22	0	1	1	0	0	0
Nebraska	1	1	0	113	40	34	0	2	1	0	1	0
Kansas	1	0	0	101	90	90	0	0	1	1	1	1
SOUTH ATLANTIC												
Delaware	0	0	0	7	14	14	0	0	0	0	0	0
Maryland [3]	0	0	0	268	88	57	0	0	0	0	6	1
District of Columbia	0	0	0	230	15	16	0	0	0	0	0	0
Virginia	0	0	0	98	53	50	0	0	0	4	1	3
West Virginia	1	0	0	63	25	48	0	0	0	0	0	2
North Carolina	0	0	0	34	35	57	0	0	0	0	2	1
South Carolina	0	3	1	8	10	8	1	0	0	5	1	1
Georgia	0	0	0	23	15	22	0	0	0	2	0	2
Florida	0	0	0	7	6	10	0	0	0	1	2	3
EAST SOUTH CENTRAL												
Kentucky	0	0	1	76	57	96	0	0	0	1	0	3
Tennessee	0	0	0	113	53	53	1	0	0	0	2	1
Alabama	1	1	1	3	11	19	0	0	0	0	2	1
Mississippi [3]	0	0	0	11	22	9	3	0	0	3	1	1
WEST SOUTH CENTRAL												
Arkansas	0	0	0	16	5	10	0	2	2	1	2	2
Louisiana	0	1	0	7	13	13	0	0	0	0	0	3
Oklahoma	0	0	0	14	28	22	0	2	4	1	1	1
Texas	4	1	0	64	76	58	3	1	1	5	3	3
MOUNTAIN												
Montana	0	0	0	65	13	25	0	0	0	0	0	0
Idaho	0	0	0	40	8	8	0	0	0	0	0	0
Wyoming	0	0	0	2	45	11	0	0	0	0	0	0
Colorado	0	0	0	53	21	43	0	0	1	0	1	0
New Mexico	0	1	0	10	0	9	0	0	0	0	0	0
Arizona	0	3	0	20	17	4	0	1	0	0	0	1
Utah [3]	0	1	0	122	64	27	0	0	0	0	0	1
Nevada	0	0	0	2	4	2	0	0	0	0	0	0
PACIFIC												
Washington	3	2	1	364	39	35	0	0	0	1	0	1
Oregon	1	1	1	125	6	12	0	1	1	2	2	2
California	3	7	1	452	197	156	0	0	0	0	9	3
Total	19	29	17	6,945	4,079	5,024	12	19	44	46	58	69
10 weeks	243	276	276	54,358	38,235	39,658	136	264	456	746	518	739

See footnotes at end of table.

Telegraphic morbidity reports from State health officers for the week ended March 11, 1944, and comparison with corresponding week of 1943 and 5-year median—Continued

Division and State	Whooping cough: Week ended— Mar. 11, 1944	Whooping cough: Week ended— Mar. 13, 1943	Whooping cough: Median 1939–43	Week ended Mar. 11, 1944: Anthrax	Dysentery: Amebic	Dysentery: Bacillary	Dysentery: Unspecified	Encephalitis, infectious	Leprosy	Rocky Mt. spotted fever	Tularemia	Typhus fever
NEW ENGLAND												
Maine	28	51	51	0	0	0	0	0	0	0	0	0
New Hampshire	0	1	5	0	0	0	0	0	0	0	0	0
Vermont	31	35	34	0	0	0	0	0	0	0	0	0
Massachusetts	77	197	197	0	0	0	0	0	0	0	0	0
Rhode Island	1	38	30	0	0	0	0	0	0	0	0	0
Connecticut	35	49	68	0	0	1	0	0	0	0	0	0
MIDDLE ATLANTIC												
New York	149	417	417	0	1	7	0	1	0	0	0	0
New Jersey	55	244	243	0	1	0	0	0	0	0	0	0
Pennsylvania	141	314	320	0	3	0	0	0	0	0	0	0
EAST NORTH CENTRAL												
Ohio	65	150	150	0	0	0	7	1	0	0	0	0
Indiana	17	36	29	0	0	0	0	0	0	0	0	0
Illinois	53	139	139	0	1	3	0	0	0	0	0	0
Michigan [2]	93	295	206	0	0	1	0	0	0	0	0	0
Wisconsin	75	225	189	0	4	0	0	1	0	0	0	0
WEST NORTH CENTRAL												
Minnesota	12	89	59	0	3	0	0	0	0	0	0	0
Iowa	8	23	23	0	0	0	0	0	0	0	0	0
Missouri	9	14	22	0	0	0	1	0	0	0	0	0
North Dakota	3	10	8	0	0	0	0	0	0	0	0	0
South Dakota	6	1	2	0	0	0	0	0	0	0	0	0
Nebraska	27	6	6	0	0	0	0	0	0	0	0	0
Kansas	31	35	38	0	0	0	0	0	0	0	2	0
SOUTH ATLANTIC												
Delaware	2	2	3	0	0	0	0	0	0	0	0	0
Maryland [2]	38	98	59	0	0	0	0	0	0	0	0	0
District of Columbia	3	26	26	0	0	0	0	0	0	0	0	0
Virginia	70	95	74	0	0	0	40	1	0	0	0	0
West Virginia	23	31	41	0	0	0	0	0	0	0	0	0
North Carolina	122	125	125	0	0	0	0	3	0	0	2	0
South Carolina	58	48	80	0	0	11	0	0	0	0	1	0
Georgia	9	28	33	0	0	0	0	0	0	0	3	9
Florida	31	14	14	0	2	0	0	0	0	0	0	3
EAST SOUTH CENTRAL												
Kentucky	90	32	42	0	0	0	0	0	0	0	0	0
Tennessee	28	106	55	0	0	0	2	1	0	0	0	1
Alabama	49	37	22	0	0	0	0	0	0	0	0	4
Mississippi [2]	------	------	------	0	0	0	0	0	0	0	0	2
WEST SOUTH CENTRAL												
Arkansas	26	20	19	0	1	0	0	0	0	0	0	0
Louisiana	2	1	3	0	2	3	0	0	1	0	1	2
Oklahoma	2	25	9	0	0	0	0	0	0	0	0	0
Texas	176	383	217	0	12	125	0	1	0	0	0	11
MOUNTAIN												
Montana	3	10	6	0	1	0	0	1	0	0	0	0
Idaho	1	0	2	0	0	0	0	0	0	0	0	0
Wyoming	5	0	0	0	0	0	0	0	0	0	0	0
Colorado	25	22	45	0	0	3	0	0	0	0	0	0
New Mexico	3	17	19	0	0	0	0	0	0	0	0	0
Arizona	43	12	20	0	0	0	20	0	0	0	0	0
Utah [2]	26	37	69	0	0	0	1	0	0	0	0	0
Nevada	1	6	6	0	0	0	0	0	0	0	0	0
PACIFIC												
Washington	35	31	32	0	0	0	0	0	0	0	0	0
Oregon	36	5	14	0	0	0	0	0	0	0	0	0
California	94	331	277	0	2	5	0	1	0	0	0	0
Total	1,917	3,911	3,916	0	33	159	71	11	1	0	9	32
10 weeks	18,335	38,789	40,078	[3] 8	249	2,032	648	102	6	2	101	417
10 weeks, 1943	------	------	------	15	261	2,118	382	102	5	2	174	511

[1] New York City only.
[2] Period ended earlier than Saturday.
[3] Later information from Texas shows 1 case of anthrax for the week ended Feb. 26, instead of none as previously reported.
[4] Including paratyphoid fever cases reported separately as follows: New York, 2; South Carolina, 1; Georgia, 1.

NOTIFIABLE DISEASES, YEAR 1943

The figures in the following table are the totals of the monthly morbidity reports received from the State Health authorities for the year 1943. These reports are preliminary and the figures are therefore more or less incomplete. In most instances they include cases reported in both civilian and military populations. The comparisons made are with similar preliminary reports; but owing to population shifts and the presence of large military populations in certain States, the figures for some States are not comparable with those for prior years, especially for certain diseases. Each State health officer has been requested to include in the monthly report for his State all diseases that are required by law or regulation to be reported in the State. The lists of diseases required to be reported are not the same for each State, although the common communicable diseases are notifiable in all the States. Certain diseases, however, may be a health problem in some States but not in others. There are variations among the States also in the degree of completeness of reporting of cases. As compared with the deaths, incomplete case reports are obvious for such diseases as malaria, pellagra, pneumonia, and tuberculosis, while in many States other diseases, such as puerperal septicemia and Vincent's infection, are not reportable.

In spite of these known deficiencies, however, these monthly reports, which are published quarterly and annually in consolidated form, have proved of value in presenting early information regarding the reported incidence of a large group of diseases and in indicating a trend by providing a comparison with similar preliminary figures for prior years. To some extent they also give a picture of the geographic prevalence of certain diseases, as the States are arranged by geographic location.

Leaders are used in the table to indicate that no case of the disease was reported.

Consolidated monthly State morbidity reports for the year 1943

Division and State	Anthrax	Chickenpox	Diphtheria	Dysentery, amebic	Dysentery, bacillary	Dysentery, undefined	Encephalitis, infectious	German measles	Hookworm disease	Influenza	Malaria	Measles	Meningitis, meningococcus	Mumps	Ophthalmia neonatorum	Pellagra	Pneumonia, all forms	Poliomyelitis
NEW ENGLAND																		
Maine	....	2,537	27	....	1	....	2	836	....	236	4	2,316	276	1,702	....	....	516	17
New Hampshire	6	549	2	....	....	....	1	1,395	....	41	....	1,019	50	315	....	....	58	13
Vermont	....	1,695	7	....	....	....	....	4,143	....	316	1	8,396	26	1,055	....	....	97	26
Massachusetts	5	11,531	163	1	146	....	37	34,144	....	....	118	35,101	864	7,086	232	....	3,102	260
Rhode Island	....	1,070	33	....	9	....	8	3,555	....	1,110	6	2,497	497	1,196	3	....	339	186
Connecticut	....	6,065	40	8	186	....	12	14,280	1	1,773	20	10,261	310	4,740	2	....	3,491	379
MIDDLE ATLANTIC																		
New York	10	23,118	415	233	1,886	....	70	[1] 14,771	....	[1] 1,382	104	71,319	2,248	6,011	108	....	25,068	692
New Jersey	8	21,617	153	40	6	9	15	51,010	....	1,324	16	44,582	880	20,129	6	....	5,425	85
Pennsylvania	29	24,859	499	10	130	....	21	[2] 29,478	....	240	4	57,150	1,213	16,086	34	4	5,657	143
EAST NORTH CENTRAL																		
Ohio	....	16,436	490	5	87	3	24	7,035	....	18,029	41	20,442	503	8,460	576	2	3,601	184
Indiana	....	3,109	352	8	14	4	5	5,260	....	3,090	281	10,407	292	2,963	....	1	1,385	108
Illinois	1	12,651	585	40	108	4	64	14,477	1	2,101	191	29,690	787	7,104	391	3	11,439	1,575
Michigan	....	18,016	282	19	204	....	8	6,026	....	1,289	257	51,763	747	7,230	18	....	4,627	150
Wisconsin	....	22,926	135	1	....	....	12	65,901	....	6,717	31	44,607	252	16,604	1	....	1,934	208

WEST NORTH CENTRAL																		
Minnesota		7,255	382	78	29	7	5			406	2	11,017	141				582	170
Iowa		2,975	156	8	1		7	3,736		22,708	16	5,903	90	2,683			641	204
Missouri		1,784	185	31	1	15	11			682	115	7,532	648	1,925	5		1,422	219
North Dakota		961	66	2	4		8			4,210	3	4,808	18	1,350			1,831	22
South Dakota		711	138	1	2		5			33	4	3,847	22	432		1	125	17
Nebraska		2,276	149				2			1,253	4	5,182	47	2,912			244	141
Kansas	1	5,380	216	8	9		29	5,326	1	5,417	45	9,399	175	4,104		1	1,460	764
SOUTH ATLANTIC																		
Delaware	2	365	11				1			14		1,791	71	115			22	7
Maryland		4,260	179	4	77	78	6	4,292		4,924	12	3,924	551	2,017	4		3,515	22
District of Columbia		844	25	5	31		1			3,100	45	2,422	170	556		1	1,494	12
Virginia		3,420	394	6		5,852	1			41,394	173	12,606	838	3,761		29	5,751	61
West Virginia		1,482	233		6		3			6,968		2,219	135	810		1	229	30
North Carolina		4,698	792	11	134					1,404	185	5,217	478			16	1,337	37
South Carolina		1,589	1,675	3	452		15	1,907	764	22,855	9,866	3,041	338	4,319	18	678	4,987	19
Georgia		1,328	499	27	315	54	4		3,402	12,547	491	4,332	180	2,253		55	2,255	27
Florida		2,476	246	146	201		15	911	3,902	796	111	1,468	260	2,649	11	23	1,777	28
EAST SOUTH CENTRAL																		
Kentucky		2,691	281	3	120		7	1,067		62,524	69	10,903	348	1,721		2	902	157
Tennessee		1,491	381	9		200	9	1,446	12	3,565	191	6,435	344	1,844	35	57	2,471	17
Alabama	2	1,263	549	8			9	1,115		7,880	3,230	4,073	281	1,456		83	4,292	29
Mississippi		5,914	333	1,227	12,117				4,502	81,083	24,284	9,225	,78	8,685	100	2,685	16,082	33
WEST SOUTH CENTRAL																		
Arkansas	1	1,464	289	75	559		2	1,879		10,031	1,156	3,056	124	925		43	2,516	78
Louisiana	3	466	261	57	216		3	209	133	4,760	302	2,504	227	1,116	1	11	1,913	69
Oklahoma	1	789	224	8	140		5		78	4,783	1,408	2,469	120	564	2	54	1,288	567
Texas	4	10,158	1,683	1,161	12,996		70			57,160	8,266	15,441	461	7,157	61	1,033	12,326	1,271
MOUNTAIN																		
Montana		1,898	70	1	7	9	7	172		6,070	6	5,766	28	2,651			388	28
Idaho		618	124				2	1,234		124	2	2,400	95	2,217			143	15
Wyoming		601	14	4		1	7	135		3,445	2	2,926	32	1,497			154	33
Colorado		4,060	371	8	123		15			4,605	30	12,042	95	3,789			1,810	291
New Mexico		474	51	6	89	73	4	225		371	11	607	30	294		11	995	77
Arizona		1,502	91	10		1,172	8	492		7,606	80	1,114	83	1,341	8	15	2,036	90
Utah		4,692	14	1		7	11	2,495		9,577	313	7,597	136	2,310			1,205	399
Nevada		330	3	2	6	31	1			2,402	4	526	28	207			187	21
PACIFIC																		
Washington		7,806	359	8	7	13	28	5,756		295	2	16,847	330	6,840			1,228	348
Oregon		2,305	118	22		6	2			5,382	23	9,006	294	3,330			1,400	405
California	4	44,918	1,198	124	503		167	36,920		14,076	2,050	24,873	1,436	27,281	11		4,475	2,685
1943	77	301,423	14,943	3,429	30,872	7,538	749	321,718	12,796	452,101	53,575	612,068	17,974	205,792	1,627	4,809	150,222	12,429
1942	89	299,779	16,421	2,492	24,056	12,820	564	130,417	20,971	156,523	58,917	546,023	3,758	278,390	1,639	6,051	128,473	4,177
Median, 1938-42	75	279,159	17,939	2,991	20,950	1,461	911	[3]100,154	30,940	272,387	77,553	546,023	1,984	147,580	1,639	8,688	130,200	7,281
Alaska		111	28		4			122		1,661	1	1,362	16	512			185	4
Hawaii Territory		1,459	64	16	118		3	313	48	10,450	233	140	51	3,510			[4] 174	75
Panama Canal Zone [5]		250	129	46	30			42			2,846	111	8	1,189			[6] 67	

[1] New York City only.
[2] First 6 months of 1943 only.
[3] 3-year (1940-42) average.
[4] Lobar pneumonia only.
[5] Including the cities of Colon and Panama.
[6] In the Canal Zone only.

Consolidated monthly State morbidity reports for the year 1943—Continued

Division and State	Puerperal septicemia	Rabies in animals	Rabies in man	Rocky Mountain spotted fever	Scarlet fever	Septic sore throat	Smallpox	Tetanus	Trachoma	Trichinosis	Tuberculosis, all forms	Tuberculosis, respiratory	Tularemia	Typhoid and paratyphoid fever	Paratyphoid fever	Typhus fever	Undulant fever	Vincent's infection	Whooping cough
NEW ENGLAND																			
Maine					728	11	1	1		1	557	496		26	1		47	76	1,810
New Hampshire				1	338	20					281			11			8	10	175
Vermont					368			1			137			17			40	26	1,071
Massachusetts		4			15,421	158		14	13	8	3,272	3,029	3	192	157	3	45		5,996
Rhode Island		2			939	92		2	2		1,104	1,075	2	16	3		9	7	1,838
Connecticut				1	2,730	212		9		18	1,299	1,256		38	12	1	74		1,859
MIDDLE ATLANTIC																			
New York		189		20	16,355	571		39		102	12,442	11,654	4	303	78	19	287		14,818
New Jersey				15	4,262	117	1	15	6	27	3,893		1	80	19		69		7,378
Pennsylvania		1	2	8	9,643		8		1	5	5,225		8	309		3	71		11,983
EAST NORTH CENTRAL																			
Ohio	1	213	2	11	10,568	120	110	22	18	3	5,613	5,477	22	283	16		100	93	8,368
Indiana			2	9	3,224	11	131	3	5		3,045	2,465	21	92		1	61	504	2,345
Illinois		434	2	12	6,984	359	67	42	186	2	8,926	8,238	55	137	14	1	312	348	7,459
Michigan		5			5,053	651	18	15	5	7	6,546		2	196	79		110	263	12,125
Wisconsin				1	9,903	47	9		4		1,628		17	36		1	180		11,098
WEST NORTH CENTRAL																			
Minnesota				1	2,835	1,318		5	3		1,768		12	16			283	10	3,441
Iowa		26		4	2,433	67	26				561	561	5	54	11		418		1,702
Missouri			1	4	3,245	16	6	8	674		2,221		19	131	4		50	38	1,316
North Dakota				2	360	11	3		174		308	238	6	18	5		13	67	801
South Dakota				4	708	21	19	3	5	1	269		3	6	1		31	2	307
Nebraska					1,268	21	18				177		1	6			10		615
Kansas		7			2,890	53	25	6	3	1	707	629	21	55	6	3	171	233	2,766
SOUTH ATLANTIC																			
Delaware		3		14	213						145	145		12			3		212
Maryland		8		48	3,066	146	1	15	2	1	3,603	3,190	9	59	3	1	9	49	4,195
District of Columbia		104	1		783						2,410	2,340		49	19		2		1,005
Virginia				55	1,842	1,086					3,793	3,793	55	215	18	30	37		5,082
West Virginia			1	15	1,927	30	5				1,643		1	154	2	3	3		2,462
North Carolina				36	2,854	201	21				1,590	1,547	14	117		162	9		8,402

South Carolina		205		2	400	172	4	6			636		15	124	24	193	14		3,772
Georgia			1	2	959	340	12	51	19	6	2,374	1,815	81	258	53	1,239	99	185	1,597
Florida		23			376	36	2	26			1,281		2	99	30	315	39	275	1,134
EAST SOUTH CENTRAL																			
Kentucky			2	6	1,973	100	13		27		2,402	2,364	20	296	4		18	5	2,368
Tennessee	7		2	22	1,979	171	9	17	5	3	3,795		86	177	16	51	42	304	3,056
Alabama		131	1	4	818		18	42			2,801		16	119	4	629	63		2,018
Mississippi	216			2	563		13		54		1,617	1,580	67	151		130	48		12,697
WEST SOUTH CENTRAL																			
Arkansas		228	1		330	570	45	1	594		984	893	80	167	4	12	13		1,488
Louisiana		111	4	1	367	104	4	21			2,123	2,044	18	239	19	230	57		334
Oklahoma	3		1	12	1,035	230	18	2	79		2,038		24	153		6	26	6	851
Texas			2	1	2,365	182	86		100		7,311		38	459	43	1,452	339		16,590
MOUNTAIN																			
Montana				29	690	49	7		2		387		51	23			11	69	1,032
Idaho	1			10	1,583	18	7				66	36		24	2		1	1	150
Wyoming				33	1,364	19		1	102		82	4	39	9			6	22	186
Colorado		5		11	1,913	27	8				1,610		10	68	7	1	40		1,627
New Mexico	11	54	1	3	229	18	4		84		1,018	938	3	97	11	1	15		575
Arizona			1		542	185	1	1	410		1,393		1	50	2		15		939
Utah				11	2,103	7	1	2	6		113	102	33	29			15		2,479
Nevada	1				73	64	1		20	2	75		6	5			8	183	85
PACIFIC																			
Washington				3	2,277	121	5	3	32		2,011	1,938	3	41	7	1	43	129	2,409
Oregon				13	1,155	28	14	2	13	1	557		5	53	12		31	196	1,377
California		739	2	5	8,240	7	5	61	130	21	10,470	9,977	8	213	48	29	244		14,320
1943	240	2,492	29	431	142,274	7,787	746	436	2,778	209	118,307	67,824	887	5,482	734	4,517	3,639	3,101	191,112
1942	285	1,920	27	413	128,345	5,446	864	397	2,603	307	102,286	50,974	900	6,602		3,725	2,965	1,322	192,003
Median, 1938–42	420	2,761	31	417	155,707	9,914	2,764	426	2,662	309	102,286	56,406	1,641	9,658		2,780	3,408	2,167	192,003
Alaska					49						256	135		2	1				80
Hawaii Territory					52	17		15	15	9	86	80		8	4	150	3		1,912
Panama Canal Zone [5]					9						[6] 19	[6] 19		35	23	1			[6] 5

[5] Including the cities of Colon and Panama.

[6] In the Canal Zone only.

See notes on page 380.

The following list includes certain rare conditions, diseases of restricted geographical distribution and those reportable in or reported by only a few States:

Actinomycosis: Massachusetts, 1; Connecticut, 2; Ohio, 2; Illinois, 5; Michigan, 4; Minnesota, 26; North Dakota, 1; South Dakota, 1; Kansas, 1; Nevada, 2.
American "Q" fever: Montana, 1.
Botulism: New York, 1; Washington, 2; California, 6.
Coccidioidomycosis: Indiana, 1; Arizona, 219; California, 18.
Conjunctivitis: New Hampshire, 13; Massachusetts, 364 (suppurative); Rhode Island, 3 (includes 2 kerato); Connecticut, 48; Indiana, 12 (kerato); Illinois, 35 (kerato); Michigan, 391 (kerato), 121 (pink eye); Missouri, 2; North Dakota, 6 (includes 4 kerato), 1 (pink eye); South Dakota, 6; Kansas, 1 (kerato), 23 (pink eye); Maryland, 79 (14 pink eye); Georgia, 15; Florida, 9; Tennessee, 9 (kerato); Oklahoma, 7 (6 pink eye); Montana, 7; Idaho, 7; Wyoming, 2 (includes 1 kerato), 4 (pink eye); New Mexico, 8; Arizona, 12; Utah, 1 (kerato); Nevada, 17; Washington, 11; California, 27 (includes ophthalmia neonatorum); Hawaii Territory, 67.
Dengue: South Carolina, 3; Florida, 4; Mississippi, 7; Louisiana, 1; Texas, 101; Nevada, 1; California, 2; Hawaii Territory, 1,351.
Diarrhea and enteritis: Rhode Island, 4; New Jersey, 65 (newborn); Ohio, 718; Indiana, 73; Illinois, 2; Michigan, 105 (newborn); North Dakota, 1; Maryland, 220 (diarrhea only); South Carolina, 13,598 (diarrhea only); Florida, 14; Wyoming, 11; New Mexico, 279; Nevada, 99 (infant); Washington, 28; California, 152 (diarrhea o newborn).
Dog bites: Illinois, 12,835 (all animals); Michigan, 7,131.
Food poisoning: Ohio, 81; Illinois, 287; Kansas, 10; Maryland, 36; Louisiana, 205; New Mexico, 8; Arizona, 75; Nevada, 30; Washington, 133; California, 1,284.
Granuloma: Ohio, 19 (unspecified); Missouri, 24 (inguinale); Tennessee, 51 (inguinale); Mississippi, 974 (inguinale); Louisiana, 74 (inguinale); Arizona, 16 (inguinale); Washington, 15 (inguinale).
Impetigo contagiosa: Ohio, 267; Indiana, 3; Illinois, 91; Michigan, 1,215; North Dakota, 17; South Dakota, 1; Kansas, 91; Maryland, 5; Florida, 17; Oklahoma, 36; Montana, 10; Idaho, 19; Wyoming, 4; Nevada, 1; Washington, 76; Oregon, 443; Alaska, 11, Hawaii Territory, 175.
Jaundice (all forms): Indiana, 3; Illinois, 2; Minnesota, 36; Maryland, 2; Florida, 17; Wyoming, 1; Arizona, 3; Utah, 2; California, 127.
Leprosy: Massachusetts, 1; New York, 5; New Jersey, 1; Pennsylvania, 1; Illinois, 1; Minnesota, 1; Florida, 1; Louisiana, 6; Texas, 6; Colorado, 1; California, 8; Hawaii Territory, 40; Panama Canal Zone, 5.
Lymphocytic choriomeningitis: Massachusetts, 3; Illinois, 2; Minnesota, 1.
Lymphogranuloma venereum: Maine, 1; Missouri, 33; Florida, 24; Tennessee, 120; Louisiana, 220; Arizona, 6; Utah, 1.
Plague (human): California, 1; Hawaii Territory, 7 (all fatal).
Psittacosis: Pennsylvania, 1; Ohio, 1.
Rat-bite fever: Minnesota, 1; Tennessee, 2; Oklahoma, 1.
Relapsing fever: Kansas, 2 Texas, 52; Nevada, 8; California, 2; Panama Canal Zone, 1.
Rheumatic fever: Illinois, 289; Michigan, 75; Missouri, 12; Maryland, 65; Georgia, 79; Idaho, 14; Wyoming, 16; Arizona, 18; Utah, 34; California, 427.
Weil's disease: Massachusetts, 2; Michigan, 33; Maryland, 4; Louisiana, 1; Utah, 1; Hawaii Territory, 49.

WEEKLY REPORTS FROM CITIES

City reports for week ended February 26, 1944

This table lists the reports from 87 cities of more than 10,000 population distributed throughout the United States, and represents a cross section of the current urban incidence of the diseases included in the table.

	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
NEW ENGLAND												
Maine:												
Portland	0	0	------	0	6	0	3	0	5	0	0	0
New Hampshire:												
Concord	0	0	------	0	1	0	0	0	2	0	0	1
Vermont:												
Barre	0	0	------	0	0	0	0	0	2	0	0	0
Massachusetts:												
Boston	4	0	------	0	43	2	13	0	92	0	0	14
Fall River	0	0	------	0	10	0	1	0	5	0	0	1
Springfield	0	0	------	0	50	0	1	0	22	0	0	4
Worcester	0	0	------	0	0	0	5	0	70	0	0	2
Rhode Island:												
Providence	0	0	2	2	211	2	4	0	9	0	0	4
Connecticut:												
Bridgeport	0	0	------	2	31	2	1	0	2	0	1	0
Hartford	0	0	------	1	3	0	0	0	4	0	0	0
New Haven	0	0	------	0	104	2	2	0	4	0	1	0
MIDDLE ATLANTIC												
New York:												
Buffalo	0	0	1	2	1	0	12	0	18	0	0	0
New York	12	0	5	1	1,642	36	90	1	316	0	1	82
Rochester	0	0	------	0	0	2	2	0	8	0	0	0
Syracuse	0	0	------	1	2	0	3	0	5	0	0	16
New Jersey:												
Camden	0	0	------	0	2	2	0	0	29	0	0	0
Newark	0	0	------	0	53	3	9	0	17	0	0	5
Trenton	0	0	------	0	7	0	3	0	8	0	0	0
Pennsylvania:												
Philadelphia	3	0	15	8	36	16	33	0	81	0	0	21
Pittsburgh	1	0	6	6	246	3	18	0	20	0	0	4
Reading	0	0	------	0	0	0	5	0	1	0	0	2
EAST NORTH CENTRAL												
Ohio:												
Cincinnati	3	0	1	1	30	9	2	0	39	0	0	2
Cleveland	0	0	1	1	966	9	6	0	67	0	0	27
Columbus	1	0	1	1	174	0	2	0	9	0	0	7
Indiana:												
Fort Wayne	0	0	------	1	7	0	2	0	2	0	0	0
Indianapolis	4	0	------	3	35	3	16	0	57	1	0	4
South Bend	0	0	------	0	1	0	0	0	2	0	0	0
Terre Haute	0	0	------	0	0	0	6	0	1	0	0	0
Illinois:												
Chicago	4	0	1	3	83	16	33	0	155	0	0	19
Springfield	0	0	------	0	173	0	3	0	2	0	0	2
Michigan:												
Detroit	1	0	4	2	76	19	14	0	89	0	0	31
Flint	0	0	------	0	28	1	5	0	1	0	0	2
Grand Rapids	0	0	------	0	213	1	2	0	8	0	0	0
Wisconsin:												
Kenosha	0	0	------	0	0	0	0	0	1	0	0	0
Milwaukee	2	0	------	0	55	3	2	0	78	0	0	31
Racine	0	0	------	0	10	0	0	0	1	0	0	4
Superior	1	0	------	0	9	0	0	0	21	0	0	2
WEST NORTH CENTRAL												
Minnesota:												
Duluth	0	0	------	0	12	0	4	0	23	0	0	12
Minneapolis	2	0	------	0	551	2	7	0	51	0	0	8
St. Paul	0	0	------	0	575	2	7	0	20	0	0	6
Missouri:												
Kansas City	2	0	------	0	13	6	6	0	46	0	0	2
St. Joseph	0	0	------	0	2	1	0	0	2	0	0	0
St. Louis	1	0	4	3	238	8	14	0	24	0	0	4

City reports for week ended February 26, 1944—Continued

	Diphtheria cases	Encephalitis, infectious, cases	Influenza Cases	Influenza Deaths	Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
WEST NORTH CENTRAL—continued												
North Dakota:												
Fargo	0	0	------	0	15	0	1	0	11	0	0	0
Nebraska:												
Omaha	5	0	------	0	7	0	6	0	25	0	0	0
Kansas:												
Topeka	0	0	------	1	3	0	1	0	2	0	0	2
Wichita	0	0	2	0	235	0	3	0	3	0	0	2
SOUTH ATLANTIC												
Delaware:												
Wilmington	0	0	------	0	11	1	5	0	1	0	0	0
Maryland:												
Baltimore	3	0	5	4	652	8	20	0	59	0	0	12
Cumberland	0	0	------	0	0	1	2	0	0	0	0	0
Frederick	0	0	------	0	0	0	0	0	1	0	0	0
District of Columbia:												
Washington	0	0	2	0	121	4	12	0	227	0	0	2
Virginia:												
Lynchburg	1	0	33	0	9	0	0	0	0	0	0	1
Richmond	0	0	------	0	204	4	5	0	8	0	0	0
Roanoke	0	0	------	0	73	0	1	0	0	0	0	0
West Virginia:												
Charleston	0	0	1	0	0	0	0	0	3	0	0	0
Wheeling	0	0	------	0	2	0	0	0	3	0	0	2
North Carolina:												
Winston-Salem	0	0	------	0	80	0	1	0	0	0	0	1
South Carolina:												
Charleston	0	0	14	0	0	4	3	0	0	0	2	0
Georgia:												
Atlanta	1	0	7	3	25	2	5	0	6	0	0	0
Brunswick	0	0	------	0	49	0	2	0	0	0	0	0
Savannah	0	0	3	1	4	2	2	0	0	0	0	0
Florida:												
Tampa	0	0	4	1	5	2	2	0	2	0	0	2
EAST SOUTH CENTRAL												
Tennessee:												
Memphis	1	0	12	3	18	6	1	0	19	0	0	3
Nashville	0	0	------	1	3	0	1	0	8	0	0	1
Alabama:												
Birmingham	2	0	11	2	48	0	5	0	1	0	0	6
Mobile	0	0	------	0	16	3	4	0	0	0	0	2
WEST SOUTH CENTRAL												
Arkansas:												
Little Rock	0	0	1	0	39	0	3	0	1	0	0	0
Louisiana:												
New Orleans	0	0	16	4	38	2	5	1	9	0	0	0
Texas:												
Dallas	0	0	2	2	57	2	6	0	5	0	0	1
Galveston	1	0	12	0	0	1	1	0	0	0	0	0
Houston	0	0	------	0	43	0	11	0	0	0	0	0
San Antonio	3	0	2	4	21	2	5	0	1	0	0	1
MOUNTAIN												
Montana:												
Billings	0	0	------	0	3	0	1	0	2	0	0	0
Great Falls	0	0	14	0	6	0	1	0	9	0	0	4
Helena	0	0	------	0	2	0	0	0	0	0	0	0
Missoula	0	0	------	0	4	0	0	0	2	0	0	1
Idaho:												
Boise	0	0	------	0	4	0	0	0	2	0	0	0
Colorado:												
Denver	1	0	3	1	106	2	11	0	17	0	1	18
Pueblo	0	0	------	0	21	0	1	0	0	0	0	2
Utah:												
Salt Lake City	0	0	------	1	3	0	1	0	44	0	0	5

City reports for week ended February 26, 1944—Continued

	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
PACIFIC												
Washington:												
Seattle	1	0	------	0	27	1	10	1	31	0	0	3
Spokane	0	0	1	1	30	1	2	0	21	0	0	0
Tacoma	0	0	------	0	0	0	0	0	57	0	0	1
California:												
Los Angeles	4	0	25	3	92	6	7	0	48	0	0	1
Sacramento	0	0	------	0	7	0	0	0	3	0	0	2
San Francisco	1	0	5	1	23	4	10	2	41	0	0	4
Total	65	0	216	71	7,805	208	493	5	2,091	1	6	348
Corresponding week, 1943	64	2	264	49	4,286	132	588	8	1,675	4	10	909
Average, 1939–43	78	----	778	[1] 63	[2] 4,066	------	[1] 546	------	1,569	13	16	1,055

[1] 3-year average, 1941–43.
[2] 5-year median.

Dysentery, amebic.—Cases Philadelphia, 1; Richmond, 1.
Dysentery, bacillary.—Cases. Providence, 4; Worcester, 2, New York, 9, Charleston, S. C., 1; Los Angeles, 3.
Dysentery, unspecified.—Cases: San Antonio, 2.
Typhus fever.—Cases: Tampa, 1; Mobile, 1; Savannah, 1; Dallas, 1; San Antonio, 1.

Rates (annual basis) per 100,000 population, by geographic groups, for the 87 cities in the preceding table (estimated population, 1942, 34,577,700)

	Diphtheria case rates	Encephalitis, infectious, case rates	Influenza		Measles case rates	Meningitis, meningococcus, case rates	Pneumonia death rates	Poliomyelitis case rates	Scarlet fever case rates	Smallpox case rates	Typhoid and paratyphoid fever case rates	Whooping cough case rates
			Case rates	Death rates								
New England	10 0	0.0	5.0	12 5	1,144	20 0	75.0	0.0	541	0.0	5.0	6[illegible]
Middle Atlantic	7 2	0 0	12 1	8 0	889	27 7	78 3	0 4	225	0.0	0 4	3[illegible]
East North Central	9 4	0 0	4.7	7 0	1,089	35 7	54 5	0.0	312	0.6	0.0	7[illegible]
West North Central	20 0	0 0	11.8	7.8	3,235	37 2	96 0	0.0	406	0 0	0.0	7[illegible]
South Atlantic	8 7	0.0	120.1	15.7	2,149	48 7	104.4	0.0	539	0.0	3.5	3[illegible]
East South Central	17 9	0.0	137.0	35.7	506	53 6	65.5	0.0	1,668	0.0	0.0	7[illegible]
West South Central	12 5	0 0	103.0	31.2	6,181	21.9	96.8	3.1	499	0.0	0.0	[illegible]
Mountain	8.1	0 0	137.0	16 1	1,201	16.1	120.9	0.0	613	0.0	8 1	24[illegible]
Pacific	10 5	0.0	54.3	8 8	314	21.0	50 8	5.3	352	0 0	0.0	1[illegible]
Total	9 8	0 0	32 7	10 7	1,180	31.5	74.5	0.8	316	0.2	0.9	5[illegible]

TERRITORIES AND POSSESSIONS

Hawaii Territory

Plague (human).—On February 10, 1944, a death from plague occurred in a 51-year-old male in Honokaa, Hamakua District, Island of Hawaii, T. H. This is the third death reported in Hamakua District this year, the others occurring on January 19 and 26, respectively.

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—Week ended February 12, 1944.—During the week ended February 12, 1944, cases of certain communicable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox		16		244	377	62	58	127	71	955
Diphtheria		16	5	58	5	2	2			88
Dysentery (bacillary)				2						2
German measles		4		14	30	13	17	10	10	98
Influenza		89	1		43	4	5		49	191
Measles	3	69	1	495	553	54	47	205	26	1,453
Meningitis, meningococcus		1		1	5					7
Mumps		1		70	264	79	12	30	40	496
Scarlet fever		5	3	63	242	67	21	67	28	496
Tuberculosis (all forms)		24		110	52	12		27	42	267
Typhoid and paratyphoid fever		2		15	1					18
Undulant fever				1						1
Whooping cough		18		69	174	3	1	8	14	296

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

NOTE.—Except in cases of unusual prevalence, only those places are included which had not previously reported any of the above-mentioned diseases, except yellow fever, during the current year. All reports of yellow fever are published currently.

A cumulative table showing the reported prevalence of these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.

(Few reports are available from the invaded countries of Europe and other nations in war zones.)

Plague

Egypt—Suez.—During the week ended February 19, 1944, 6 cases of plague with 2 deaths were reported in Suez, Egypt, as compared with 5 cases of plague with 2 deaths reported for the preceding week.

Smallpox

Egypt—Port Said.—During the week ended February 12, 1944, 64 cases of smallpox with 2 deaths were reported in Port Said, Egypt.

India—Calcutta.—Deaths from smallpox in Calcutta, India, continue to rise with 254 deaths reported for the week ended February 12, 1944, as compared with 230 deaths reported for the preceding week.

Mexico—Torreon.—For the week ended February 26, 1944, 17 cases of smallpox were reported in Torreon, Mexico.

Typhus Fever

Ecuador.—For the period December 16–31, 1943, 8 cases of typhus fever with 3 deaths were reported in Ecuador.

Mexico.—For the 2 weeks ended January 15, 1944, 40 cases of typhus fever were reported in Mexico, including 21 cases reported in Mexico, D. F.

×

FEDERAL SECURITY AGENCY

UNITED STATES PUBLIC HEALTH SERVICE

THOMAS PARRAN, *Surgeon General*

DIVISION OF PUBLIC HEALTH METHODS

G. ST. J. PERROTT, *Chief of Division*

The PUBLIC HEALTH REPORTS, first published in 1878 under authority of an act of Congress of April 29 of that year, is issued weekly by the United States Public Health Service through the Division of Public Health Methods, pursuant to the following authority of law: United States Code, title 42, sections 7, 30, 93; title 44, section 220.

It contains (1) current information regarding the prevalence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

The PUBLIC HEALTH REPORTS is published primarily for distribution, in accordance with the law, to health officers, members of boards or departments of health, and other persons directly or indirectly engaged in public health work. Articles of special interest are issued as reprints or as supplements, in which forms they are made available for more economical and general distribution.

Requests for and communications regarding the PUBLIC HEALTH REPORTS, reprints, or supplements should be addressed to the Surgeon General, United States Public Health Service, Washington, D. C. Subscribers should remit direct to the Superintendent of Documents, Washington, D. C.

Librarians and others should preserve their copies for binding, as the Public Health Service is unable to supply the general demand for bound copies. Indexes will be supplied upon request.

UNITED STATES GOVERNMENT PRINTING OFFICE, WASHINGTON : 1944

For sale by the Superintendent of Documents, Washington, D. C.

Price 5 cents. Subscription price $2.50 a year

Public Health Reports

VOLUME 59 **MARCH 24, 1944** **NUMBER 12**

IN THIS ISSUE

CONTENTS

Public Health Reports

Vol. 59 • MARCH 24, 1944 • *No. 12*

PLAGUE. SULFADIAZINE TREATMENT OF GUINEA PIGS INFECTED BY ARTIFICIAL METHODS OR BY FLEA TRANSMISSION

By N. E. WAYSON, *Medical Director*, and MARGARET C. MCMAHON, *Senior Medical Technician, United States Public Health Service*

Reports have been made of the therapeutic value of each of several sulfonamide compounds in human cases of plague (*1–8*), and the results of treatment of inoculated animals with sulfanilamide, sulfapyridine, or sulfathiazole (*5, 9–12*). The reports of the clinical course of the disease in man when under therapy with these drugs have varied widely and a consensus regarding its efficacy does not seem to have been reached. Some of the divergence of opinion seems to arise from failure to consider its value in different stages or types of the disease. The results with experimental animals seem more consistently satisfactory, but the conditions of the experiments have been rather artificial in that the animals were inoculated subcutaneously and treatment was initiated before inoculation, contemporary with it, or at a predetermined number of hours thereafter.

The inconsistency of the results obtained in man with the different sulfa derivatives administered and the selectivity of the experimental methods used with the laboratory animals appeared to warrant further tests and a trial of sulfadiazine which is excreted more slowly than other forms of these compounds. A further stimulus to additional tests arose from the observation that the growth of *P. pestis* was inhibited when planted on 5 percent blood agar plates prepared from human blood containing 1.1 mg. percent of sulfonamide.

The experiments were designed to reproduce in guinea pigs, as closely as practicable, the course of the disease in man and to determine the therapeutic value of the drug when administered after the characteristic buboes had developed and before the occurrence of a septicemia. The bubo is a finding which can be recognized in both man and guinea pig and is the first criterion which suggests the diagnosis in many human cases.

Fifty guinea pigs were used in the tests. Twenty-six received sulfadiazine and 24 did not but were matched individually insofar as possible with a treated animal with regard to weight, general physical condition, method of inducing infection, characteristic clinical findings,

and nonspecific administrations. Twenty-two of the 24 controls died of plague; another developed enormous buboes, became thin and was febrile, but lived for 34 days after inoculation when it was killed and the infection proved bacteriologically; the other animal died of hemorrhage on the third day after inoculation without showing definite evidence of plague. Seven of the 26 treated animals died. One of these 7 showed no evidence of infection when it died 11 days after inoculation but the pelves and ureters of the kidneys were stuffed with crystals of a sulfonamide. Another was progressing favorably toward recovery but developed an acute purulent cervical adenitis probably caused by injury from a capsule being pushed deep into its pharynx in order to assure its being swallowed.

All the animals used in the test were examined by necropsy and bacteriological methods before they were discharged, at death, or when killed after clinical recovery and survival for at least 21 days after inoculation. Among the animals which died while under treatment, it was noted that there were but few organism. obtained in preparations from their tissues, and that most of these were of involution forms in contrast to the large numbers of typical morphology obtained from the controls.

Preliminary series of animals were tested by the use of sulfathiazole; dosage was guided in frequency and amount by determination of the amount of sulfonamide which persisted in samples of heart blood withdrawn at varying periods after administration (Bratton and Marshall method). It was found difficult to maintain consistently in the blood an amount of drug which was believed necessary to accomplish good therapy. Sodium sulfadiazine was then tried and was found to effect rapidly a good blood level, but the level also declined rapidly. The treatment adopted was an initial dose of 100 mg. of sodium sulfadiazine administered subcutaneously in aqueous solution and 100 mg. of sulfadiazine given in a capsule by mouth. This dose was followed by 100-mg. capsules, by mouth, as frequently and for as long a period as seemed indicated by the course of the infection in the individual animal. All but five of the animals receiving the sulfadiazine were given sodium bicarbonate in capsules by mouth in dosage approximately double that of the drug.

Drug treatment was instituted in 25 animals after a papule had developed at the site of inoculation or flea bite with a rise of temperature to 39° C. and an unmistakable bubo had developed in one or two contiguous lymph nodes. One animal developed a papule and fever but failed to show a definite bubo.

The tests were run in parallel on a treated animal and an untreated control, with but two exceptions in each of which there were two treated animals and one untreated as the control. The inequality in

the number of controls in this test resulted from the technical difficulties of obtaining comparable animals which had been infected by flea bites on the same day.

Two groups of ten each were inoculated intracutaneously on the abdomen with suspensions of a blood agar culture of *P. pestis*, strain No. 3035, grown 24 hours at 30° C. This strain had consistently killed guinea pigs, white rats, and white mice under various experimental conditions throughout the past 2 years. Approximately 1,500 organisms were given to each of one group; 12,000 to a second group;

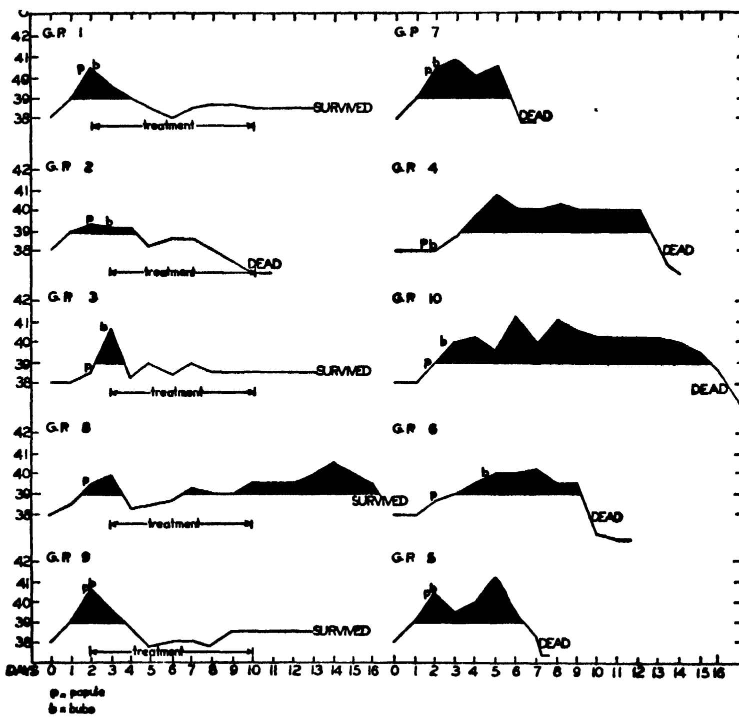


FIGURE 1.—Guinea pigs inoculated intracutaneously with 1500±*P. pestis*, strain B 3035, showing period and range of temperature, survivals, and deaths among those treated with sulfadiazine and those without treatment.

and 25,000 of a recently isolated strain, D 67, to the third group. The number of organisms was determined by turbidity standards and by plating out on blood agar.

Twenty animals were infected by the bites of fleas (*Xenopsylla cheopis*) which had previously fed on guinea pigs artificially inoculated with the same strain of *P. pestis*.

Blood cultures and determinations of the drug content were made on samples of heart blood from 20 of the treated animals. A check on the drug content in the blood of 6 others was made by micro methods on blood from a vein in the foot. It was found that frequent

heart puncture and withdrawal of a sample of 2 cc. of blood weakened the animal even though dextrose-saline solution was returned intraperitoneally; hence the frequency of sampling was lessened somewhat with succeeding groups and discontinued toward the last of the series. However, among the 15 animals inoculated artificially and treated, there were cultures of 43 blood samples of which 1 was positive; among the corresponding 15 untreated controls, cultures were made of 38 samples and 14 were positive. Among 5 of the animals infected by fleas and treated, there were cultures of 4 samples, 3 of which were positive. One of these was positive before treatment began. Among the 5 untreated controls, there were 4 blood cultures and all

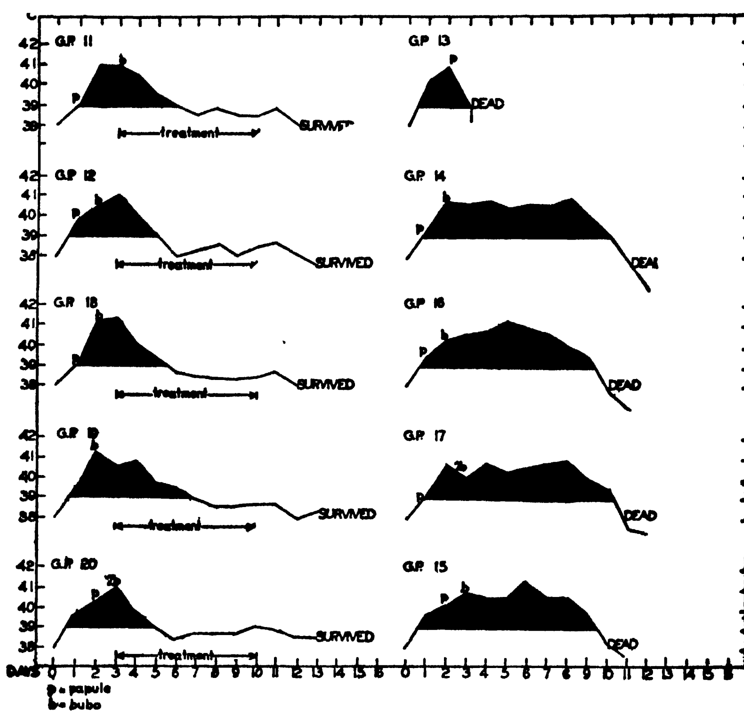


FIGURE 2.—Guinea pigs inoculated intracutaneously with 12,000± *P. pestis*, strain B 3035, showing period and range of temperature, survivals, and deaths among those treated with sulfadiazine and sodium bicarbonate and those without treatment.

were positive. The blood level of the drug in 44 specimens of heart blood collected at different periods from animals while under treatment varied from 1 mg. percent to 10 mg. percent with a median level of approximately 5.5 mg. percent, and approximately this same level was obtained in the peripheral blood from the foot.

Figures 1, 2, and 3 record the results of the individual animals of the groups which were inoculated intracutaneously with varying numbers of *P. pestis*, and show the temperature range, time of appearance

of the papule and bubo, period of treatment, and final results among those treated with the drug and the comparable untreated controls.

Figures 4, 5, and 6 record similar findings among the animals which were infected by the bites of fleas.

The protocols of the details of treatment, observations, and final results for each animal are appended.

It will be seen that among animals inoculated in a manner to simulate a flea bite with numbers of *P. pestis* varying from approximately 1,500 to 25,000 there were 13 of 15 untreated controls which died of

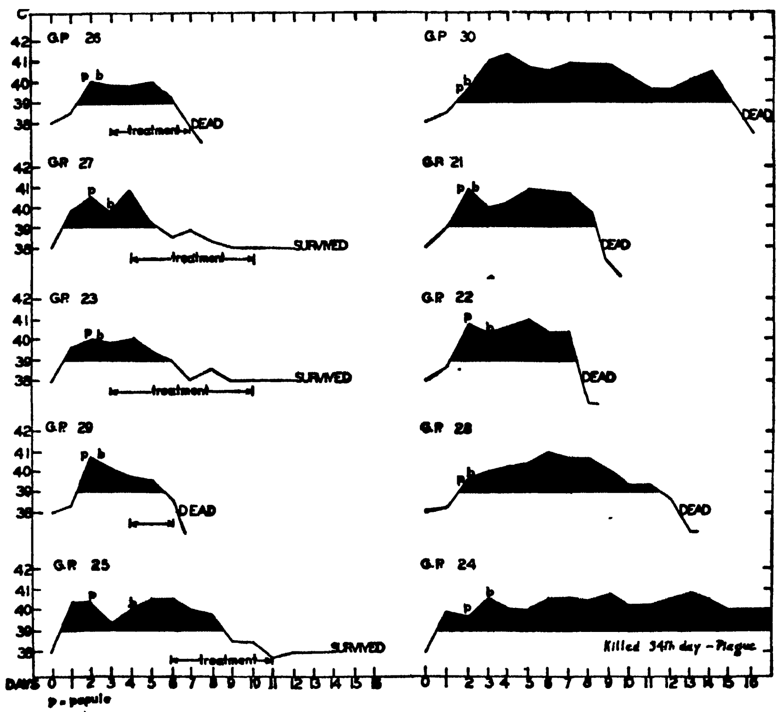


FIGURE 3.—Guinea pigs inoculated intracutaneously with 25,000±*P. pestis*, strain D 67, showing period and range of temperature, survivals, and deaths among those treated with sulfadiazine and sodium bicarbonate and those without treatment.

plague. (One was ill with plague and killed on the thirty-fourth day after inoculation; another died of hemorrhage without evidence of plague.) All of these developed a rise in temperature of from 39° to 41° C., and a papule or bubo or both. These findings continued through several days until about 20 to 30 hours before death when the temperature fell critically. Among fifteen animals similarly inoculated and treated with the drug, the temperature and findings developed but persisted for a shorter period, in most instances with a gradual return to normal with the exception of three which died. One of

these, No. 2, showed no evidence of plague at its necropsy, and probably died of a toxic condition caused by the drug. One death, No. 26, occurred in one of the few treated animals which developed a septicemia.

Nine untreated controls which were infected by flea bites developed the findings described above and died of plague, while among 11 animals similarly infected and treated with the drug, 4 died. One of these, No. 32, died of an acute cervical adenitis probably of traumatic origin. Treatment of another, No. 36, was delayed for 5 days after

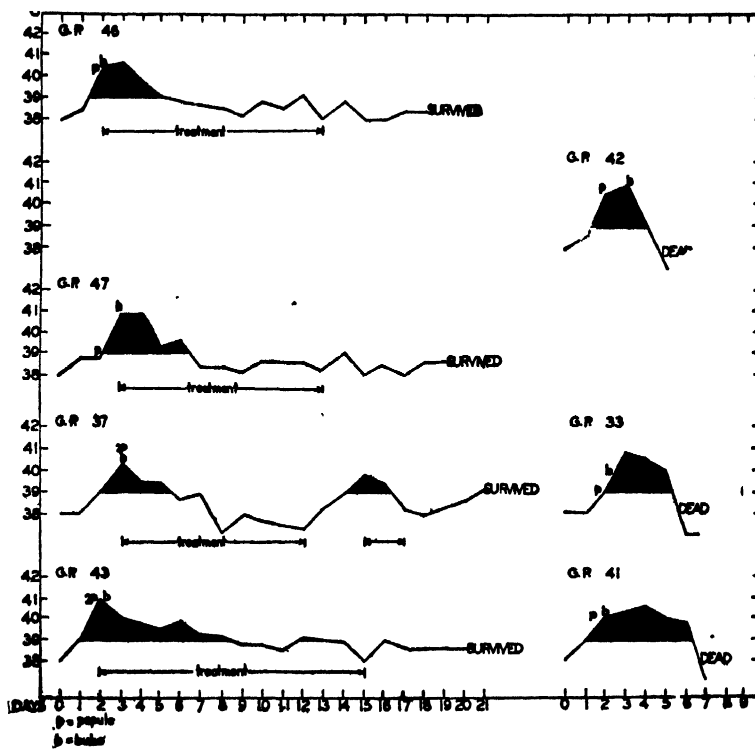


FIGURE 4.—Guinea pigs infected by bites of fleas infected with *P. pestis*, strain B 3035, showing period and range of temperature, survivals, and deaths among those treated with sulfadiazine and sodium bicarbonate and those without treatment.

inoculation while waiting for the development of a bubo, and septicemia had developed before treatment was commenced. Three of these animals infected by flea bites developed septicemia either before or shortly after treatment was begun. It was noted that the development of septicemia occurred more frequently and death occurred after a shorter course of the disease among animals infected by flea bites.

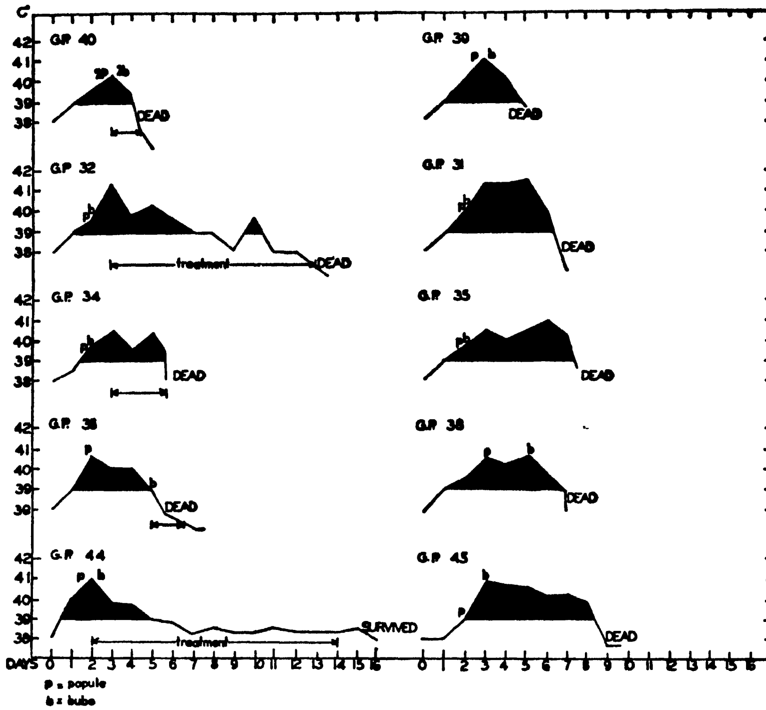


FIGURE 5.—Guinea pigs infected by bites of fleas infected with *P. pestis*, strain B 3035, showing period and range of temperature, survivals, and deaths among those treated with sulfadiazine and sodium bicarbonate and those without treatment.

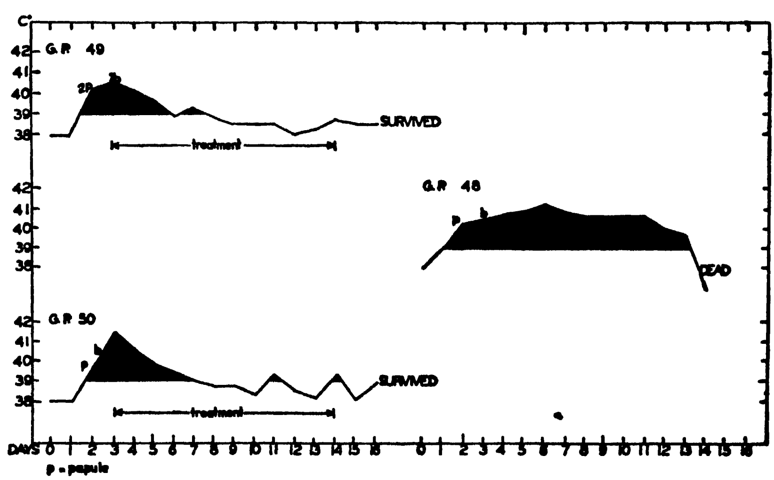


FIGURE 6.—Guinea pigs infected by bites of fleas infected with *P. pestis*, strain B 3035, showing period and range of temperature, survivals, and deaths among those treated with sulfadiazine and sodium bicarbonate and those without treatment.

SUMMARY AND CONCLUSIONS

Fifteen guinea pigs were inoculated intradermally with virulent *P. pestis* and developed plague, but 13 recovered after treatment with sulfadiazine and showed no evidence of infection at necropsy when killed 21 days after inoculation, and one died with sulfonamide crystals in the kidneys. Thirteen untreated controls died of plague after similar inoculation. One control died of hemorrhage 3 days after inoculation without evidence of plague; one control was killed the thirty-fourth day after inoculation and plague was proved bacteriologically at necropsy.

Eleven guinea pigs infected with plague by flea bites developed the disease, but 7 recovered under treatment with sulfadiazine and showed no evidence of the infection at necropsy 21 days after inoculation. Nine untreated controls which were infected in a similar manner developed the disease and died.

These experiments indicate that the administration of sulfadiazine to guinea pigs in which buboes of plague have been contracted by flea transmission or have been induced by artificial methods simulating flea transmission is of very definite remedial value. The drug treatment should begin as soon as the characteristic buboes and fever have developed and should continue through the febrile period. A blood level of 4 to 7 mg. percent of the drug was usually maintained, but no attempt was made to determine the level required for therapeutic efficiency.

The similarity of the evolution and manifestations of plague induced in guinea pigs and in man by flea transmission lead to the conclusion that this drug may be of great value in the therapy of bubonic plague in man previous to the development of a generalized bacteremia.

REFERENCES

(1) Carman, John: Prontosil in the treatment of oriental plague. East African Med. J., **14:** 362–366 (1938).

(2) Burton, E., and Henessey, R. S. F.: An unusual case of plague meningitis. East African Med. J., **17:** 266–270 (1940).

(3) Wagle, P. M., Sokhey, S. S., Dikshit, B. B., and Ganapathy, K.: Chemotherapy in plague. Ind. Med. Gaz., **76:** 29–32 (1941).

(4) Chopra, R. N., DeMonte, A. J. H., and Chatterji, B. C.: A case of plague successfully treated with sulfapyridine. Ind. Med. Gaz., **76:** 89–90 (1941).

(5) Girard, G: Treatment of plague by sulphonamides—experimental and human. Bull. Soc. Path. Exot., **34:** 37–48 (1941).

(6) De Villafane Lastra, T., Sosa Gallardo, J., and Fernando Videca, L: Three cases of bubonic plague treated with sulfathiazole. Semana Med., **48:** 1073–1079 (1941).

(7) Plum, D.: The plague epidemic in Nairobi with special reference to place, incidence, and treatment. East African Med. J., **19:** 3–9 (1942).

(8) Burga Saavedra, V.: Two cases of bubonic plague successfully treated with sulfathiazole. Actualidad Med. Peruana Lima, **8:** 26–27 (1942).

(9) Schütze, H.: Chemotherapy in plague infection. Lancet, 1: 266–268 (1939).
(10) Durand, P.: Dagenan in the treatment of plague. Arch. Inst. Past. De Tunis, 28: 96–106 (1939).
(11) Sokhey, S. S., and Dikshit, B. B.: Sulfathiazole in bubonic plague. Lancet, 1: 1040 (1940).
(12) Savino, E., and Villazon, N. M.: Action of sulfanilamide, sulfapyridine, and sulfathiazole in experimental plague. Rev. Inst. Bact., 11: 70–76 (1942).
(13) Bratton, A. C., and Marshall, E. K., Jr.: A new coupling component for sulfanilamide determination. J. Biol. Chem., 128: 537 (1939).

Appendix

Protocols of guinea pigs inoculated with P. pestis *or infected by flea bites and treated with sulfadiazine*

(First dose 100 mg. sodium sulfadiazine and 100 mg. sulfadiazine. Subsequent doses, 100 mg. sulfadiazine.)

Guinea pig No.	Inoculation	Clinical course from hour of inoculation	Treatment from hour of inoculation	Blood level free sulfadiazine from hour of treatment	Results
1	1500±*P. pestis*, strain B 3035, intracutaneous.	42 hrs. Papule. 48 hrs. Bubo. 66 hrs. Blood culture negative. 90 hrs. Do. 138 hrs. Do. 162 hrs. Bubo small, papule healing. 186 hrs. Blood culture negative.	48 hrs. First dose. 3 doses daily for 7 days. 2 doses daily for 1 day. Total treatment 9 days with 2,400 mg. sulfadiazine, 100 mg. sodium sulfadiazine.	18 hrs. 2 mg. percent. 42 hrs. 5 mg. percent. 90 hrs. 10 mg percent. 138 hrs. 7 mg. percent.	Survived and killed 21st day. Necropsy, no plague.
7 (Control)	1500±*P. pestis*, strain B 3035, intracutaneous.	42 hrs. Papule. 48 hrs. Bubo. 66 hrs. Blood culture negative. 90 hrs. Blood culture positive. 138 hrs. Do.	No treatment.		Found dead morning 7th day. Necropsy, plague.
2	1500±*P. pestis*, strain B 3035, intracutaneous.	42 hrs. Papule. 66 hrs. Bubo. 90 hrs. Blood culture negative. 138 hrs. Do. 162 hrs. Papule and bubo healing. 186 hrs. Blood culture negative. 216 hrs. Buboes very small. 248 hrs. Animal sick.	72 hrs. First dose. 76 hrs. Second dose. 3 doses daily for 6 days. 2 doses daily for 1 day. Total treatment 8 days, with 2,200 mg. sulfadiazine, 100 mg. sodium sulfadiazine.	18 hrs. 3.5 mg. percent. 66 hrs. 8.0 mg. percent. 114 hrs. 7.0 mg. percent. Post mortem: Free 40.0 mg. percent. Total 64.5 mg. percent.	Found dead morning 11th day. Necropsy, no plague.
4 (Control)	1500±*P. pestis*, strain B 3035, intracutaneous.	42 hrs. Papule. 48 hrs. Bubo. 90 hrs. Blood culture negative. 112 hrs. Bubo large. 138 hrs. Blood culture negative. 186 hrs. Do.	No treatment.		Found dead morning 14th day. Necropsy, plague.
3	1500±*P. pestis*, strain B 3035, intracutaneous.	42 hrs. Papule. 66 hrs. Bubo. 90 hrs. Blood culture negative. 138 hrs. Do. 162 hrs. Papule healing. 183 hrs. Blood culture negative. 216 hrs. Papule healed, very small bubo.	72 hrs. First dose. 3 doses daily for 6 days. 2 doses daily for 1 day. Total treatment 8 days with 2,100 mg. sulfadiazine, 100 mg. sodium sulfadiazine.	18 hrs. 3.8 mg. percent. 66 hrs. 8.0 mg. percent. 114 hrs. 10.0 mg. percent.	Survived and killed 21st day. Necropsy, no plague.

10 (Control)	1500±*P. pestis*, strain B 3035, intracutaneous.	42 hrs. 66 hrs. 90 hrs. 138 hrs. 186 hrs. 234 hrs.	Papule. Bubo. Blood culture negative. Do. Do. Two large buboes, thick infiltration of skin.	No treatment.			Found dead morning 18th day. Necropsy, plague.
8	1500±*P. pestis*, strain B 3035, intracutaneous.	42 hrs. 90 hrs. 138 hrs. 186 hrs.	Papule. Blood culture negative. Do. Do.	72 hrs. First dose. 3 doses daily for 6 days. 2 doses daily for 1 day. Total treatment 8 days, with 2,100 mg. sulfadiazine, 100 mg. sodium sulfadiazine.	18 hrs. 66 hrs. 114 hrs.	4.0 mg. percent. 8.5 mg. percent. 7.0 mg. percent.	Survived and killed 21st day. Necropsy, no plague.
6 (Control)	1500±*P. pestis*, strain B 3035, intracutaneous.	42 hrs. 90 hrs. 114 hrs. 138 hrs. 186 hrs.	Papule. Blood culture negative. Bubo. Blood culture negative. Blood culture positive.	No treatment.			Death on 11th day. Necropsy, plague.
9	1,500±*P. pestis*, strain B 3035, intracutaneous.	42 hrs. 66 hrs. 90 hrs. 138 hrs. 162 hrs. 166 hrs.	Papule and bubo. Blood culture negative. Do. Do. Bubo small. Blood culture negative.	48 hrs. First dose. 3 doses daily for 7 days. 2 doses daily for 1 day. Total treatment 9 days with 2,400 mg. sulfadiazine, 100 mg. sodium sulfadiazine.	18 hrs. 42 hrs. 90 hrs. 138 hrs.	3.0 mg. percent. 2.0 mg. percent. 9.5 mg. percent. 6.0 mg. percent.	Survived and killed 21st day. Necropsy, no plague.
5 (Control)	1,500±*P. pestis*, strain B 3035, intracutaneous.	42 hrs. 66 hrs. 90 hrs.	Papule and bubo. Blood culture positive. Do.	No treatment.			Death on 7th day. Necropsy, plague.
11	12,000±*P. pestis*, strain B 3035, intracutaneous.	24 hrs. 66 hrs. 114 hrs. 144 hrs. 162 hrs. 210 hrs. 216 hrs. 288 hrs.	Papule. Bubo. Blood culture negative. Bubo smaller. Blood culture negative Papule healing. Blood culture negative. Small, hard bubo. Bubo gone.	72 hrs. First dose. 3 doses daily for 5 days. 2 doses daily for 2 days. Total treatment 8 days with 2 000 mg. sulfadiazine, 100 mg. sodium sulfadiazine, 4,000 mg. sodium bicarbonate.	42 hrs. 90 hrs. 138 hrs.	4.0 mg. percent. 3.5 mg. percent. 7.5 mg. percent.	Survived and killed 21st day. Necropsy, no plague.
13 (Control)	12,000±*P. pestis*, strain B 3035, intracutaneous.	42 hrs.	Papule.	No treatment.			Found dead morning 3rd day. Necropsy, hemorrhage.
12	12,000±*P. pestis*, strain B 3035, intracutaneous.	24 hrs. 42 hrs. 114 hrs. 144 hrs. 162 hrs. 210 hrs. 288 hrs.	Papule. Bubo. Blood culture negative. Bubo smaller. Blood culture negative. Papule healing. Blood culture negative. Small, hard bubo. Guinea pig thin, but well.	72 hrs. First dose. 3 doses daily for 5 days. 2 doses daily for 2 days. Total treatment 8 days, with 2,000 mg. sulfadiazine, 100 mg. sodium sulfadiazine, 4,000 mg. sodium bicarbonate.	42 hrs. 90 hrs. 138 hrs.	4.5 mg. percent. 4.5 mg. percent. 6.0 mg. percent.	Survived and killed 21st day. Necropsy, no plague.

Protocols of guinea pigs inoculated with P. pestis *or infected by flea bites and treated with sulfadiazine*—Continued

Guinea pig No.	Inoculation	Clinical course from hour of inoculation	Treatment from hour of inoculation	Blood level free sulfadiazine from hour of treatment	Results
14 (Control)	12,000±*P. pestis*, strain B 3035, intracutaneous.	24 hrs. Papule. 42 hrs. Bubo. 114 hrs. Blood culture negative. 144 hrs. Thick infiltration around large bubo. 162 hrs. Blood culture negative. 210 hrs. Do. 224 hrs. Guinea pig sick.	No treatment.		Found dead morning 12th day. Necropsy, plague.
18	12,000±*P. pestis*, strain B 3035, intracutaneous.	24 hrs. Papule. 42 hrs. Bubo. 114 hrs. Blood culture negative. 138 hrs. Bubo very large. 162 hrs. Blood culture negative. Papule healed. 210 hrs. Blood culture negative. 234 hrs. Bubo small.	66 hrs. First dose. 3 doses daily for 5 days. 2 doses daily for 2 days. Total treatment 8 days, with 2,000 mg. sulfadiazine, 100 mg. sodium sulfadiazine, 4,000 mg. sodium bicarbonate.	48 hrs. 3.0 mg. percent. 96 hrs. 5.5 mg. percent. 144 hrs. 6.5 mg. percent.	Survived and killed 21st day. Necropsy, no plague.
16 (Control)	12,000±*P. pestis*, strain B 3035, intracutaneous.	24 hrs. Papule. 42 hrs. Bubo. 114 hrs. Blood culture negative. 162 hrs. Do. 210 hrs. Blood culture positive.	No treatment.		Death on 11th day. Necropsy, plague.
19	12,000±*P. pestis*, strain B 3035, intracutaneous.	48 hrs. Bubo. 90 hrs. Small and large bubo. 114 hrs. Blood culture negative. 162 hrs. Blood culture negative. Papule healed. 210 hrs. Blood culture negative. 234 hrs. One small bubo.	72 hrs. First dose. 3 doses daily for 5 days. 2 doses daily for 2 days. Total treatment 8 days, with 2,000 mg. sulfadiazine, 100 mg. sodium sulfadiazine, 4,000 mg. sodium bicarbonate.	42 hrs. 4.5 mg. percent 90 hrs. 5.5 mg. percent. 138 hrs. 7.0 mg. percent.	Survived and killed 21st day. Necropsy, no plague.
17 (Control)	25,000±*P. pestis*, strain B 3035, intracutaneous.	24 hrs. Papule. 66 hrs. Two buboes. 114 hrs. Blood culture negative. 162 hrs. Do. 210 hrs. Buboes very large with thick infiltration of surrounding skin. Blood culture negative.	No treatment.		Found dead morning 12th day. Necropsy, plague.
20	12,000±*P. pestis*, strain B 3035, intracutaneous.	42 hrs. Papule. 66 hrs. Two buboes. 114 hrs. Blood culture negative. 144 hrs. Buboes smaller. 162 hrs. Blood culture negative. 210 hrs. Do. 234 hrs. One small bubo.	72 hrs. First dose. 3 doses daily for 5 days. 2 doses daily for 2 days. Total treatment 8 days, with 2,000 mg. sulfadiazine, 100 mg. sodium sulfadiazine, 4,000 mg. sodium bicarbonate.	42 hrs. 4.5 mg. percent. 90 hrs. 5.5 mg. percent. 138 hrs. 5.5 mg. percent.	Survived and killed 21st day. Necropsy, no plague.

15 (Control)	12,000±*P. pestis*, strain B 3035, intracutaneous.	48 hrs. Papule. 66 hrs. Bubo. 114 hrs. Blood culture positive. 162 hrs. Do. 210 hrs. Do.	No treatment		Found dead morning 11th day. Necropsy, plague.
26	25,000±*P. pestis*, strain D 67, intracutaneous.	48 hrs. Papule and bubo. 72 hrs. Guinea pig sick. 96 hrs. Blood culture positive. 120 hrs. Bubo large. 144 hrs. Blood culture negative. 150 hrs. Guinea pig sick. 170 hrs. Post-mortem blood culture negative.	72 hrs. First dose. 76 hrs. Second dose. 80 hrs. Third dose. 3 doses daily for 3 days. 2 doses daily for 1 day. Total treatment 5 days, with 1,400 mg. sulfadiazine, 300 mg. sodium sulfadiazine, 2,800 mg. sodium bicarbonate.	24 hrs. 3.4 mg. percent. 72 hrs. 3.8 mg. percent.	Death on 7th day. Necropsy, plague.
30 (Control)	25,000±*P. pestis*, strain D 67, intracutaneous.	48 hrs. Papule and bubo. 96 hrs. Blood culture negative. 144 hrs. Blood culture negative. Large and small bubo. 192 hrs. Blood culture negative. 246 hrs. Guinea pig sick.	No treatment.		Found dead morning 16th day. Necropsy, plague.
27	25,000±*P. pestis*, strain D 67, intracutaneous.	48 hrs. Papule. 54 hrs. Bubo. 144 hrs. Blood culture negative. Two small buboes. 192 hrs. Blood culture negative. 240 hrs. One very small bubo.	96 hrs. First dose. 100 hrs. Second dose. 104 hrs. Third dose. 3 doses daily for 4 days. 2 doses daily for 2 days. Total treatment 7 days, with 1,900 mg. sulfadiazine, 100 mg. sodium sulfadiazine, 3,800 mg. sodium bicarbonate.	48 hrs. 5.0 mg. percent. 96 hrs. 10.0 mg. percent.	Survived and kil'ed 21st day. Necropsy, no plague.
21 (Control)	25,000±*P. pestis*, strain D 67, intracutaneous.	48 hrs. Papule and bubo. 72 hrs. Two small buboes. 144 hrs. Blood culture positive. 192 hrs. Do.	No treatment.		Death on 9th day. Necropsy, plague.
23	25,000±*P. pestis* strain D 67, intracutaneous.	48 hrs. Papule and bubo. 72 hrs. Guinea pig sick. 96 hrs. Blood culture negative. 144 hrs. Blood culture negative. Papule open. 168 hrs. Bubo smaller. 192 hrs. Blood culture negative. Papule healing.	75 hrs. First dose. 3 doses daily for 6 days. 2 doses daily for 2 days. Total treatment 8 days, with 2,000 mg. sulfadiazine, 100 mg. sodium sulfadiazine, 4,000 mg. sodium bicarbonate.	21 hrs. 3.0 mg. percent. 69 hrs. 6.0 mg. percent. 117 hrs. 6.0 mg. percent.	Survived and killed 21st day. Necropsy, no plague.
22 (Control)	25,000±*P. pestis*, strain D 67, intracutaneous.	48 hrs. Papule. 72 hrs. Bubo. 96 hrs. Blood culture positive. Two small buboes. 144 hrs. Blood culture positive 192 hrs. Do	No treatment.		Death on 8th day. Necropsy, plague.

Protocols of guinea pigs inoculated with P. pestis *or infected by flea bites and treated with sulfadiazine*—Continued

Guinea pig No.	Inoculation	Clinical course from hour of inoculation	Treatment from hour of inoculation	Blood level free sulfadiazine from hour of treatment	Results
29	25,000± *P. pestis*, strain D 67, intracutaneous.	48 hrs. Papule and bubo. 96 hrs. Guinea pig thin 144 hrs. Blood culture negative. Small and large bubo 150 hrs. Guinea pig sick.	96 hrs First dose. 100 hrs. Second dose. 104 hrs Third dose 3 doses daily for 2 days. Total treatment 3 days, with 800 mg sulfadiazine, 200 mg. sodium sulfadiazine, 1,800 mg. sodium bicarbonate.	48 hrs 6.0 mg. percent.	Found dead morning 7th day. Necropsy, plague.
28 (Control)	25,000± *P. pestis*, strain D 67, intracutaneous.	48 hrs. Papule and bubo. 144 hrs. Blood culture negative. Small and large bubo. 192 hrs. Blood culture negative. 240 hrs. Guinea pig sick.	No treatment.		Death on 13th day. Necropsy, plague.
25	25,000± *P. pestis*, strain D 67, intracutaneous.	48 hrs. Papule. 96 hrs. Bubo. 102 hrs. Two small buboes. 120 hrs. Buboes larger. 168 hrs. Blood culture negative. Buboes large. 192 hrs. Blood culture negative. 240 hrs. Buboes small.	144 hrs. First dose. 148 hrs. Second dose. 2 doses daily for 1 day. 3 doses daily for 3 days. 2 doses daily for 1 day. Total treatment 6 days, with 1,600 mg. sulfadiazine, 100 mg. sodium sulfadiazine, 3,400 mg. sodium bicarbonate	30 hrs. 8.0 mg. percent. 48 hrs. 2.0 mg. percent.	Survived and killed 21st day. Necropsy, no plague.
24 (Control)	25,000± *P. pestis*, strain D 67, intracutaneous.	48 hrs. Papule. 72 hrs. Bubo. 144 hrs. Bubo large. 168 hrs. Blood culture negative. 192 hrs. Do. 240 hrs. Very large and small bubo. 288 hrs. Two very large buboes. 816 hrs. Do.	No treatment.		Killed on 34th day. Necropsy, plague.
46	Flea bite, strain B 3035.	48 hrs. Papule and bubo. 100 hrs. Large and small bubo. 168 hrs. Papule healed, buboes smaller.	52 hrs. First dose. 3 doses daily for 6 days. 2 doses daily for 5 days. Total treatment, 12 days, with 2,900 mg. sulfadiazine, 200 mg. sodium sulfadiazine, 5,800 mg. sodium bicarbonate.	36 hrs. 7.0 mg. percent. Micro test.	Survived and killed 21st day. Necropsy, no plague.

47	Flea bite, strain B 3035.	48 hrs. Papule. 72 hrs. Bubo. 168 hrs. Papule healed, bubo smaller.	78 hrs. First dose. 3 doses daily for 6 days. 2 doses daily for 4 days. Total treatment, 11 days, with 2,700 mg. sulfadiazine, 200 mg. sodium sulfadiazine, 5,200 mg. sodium bicarbonate.	18 hrs. 7.0 mg. percent. 264 hrs. 7.5 mg. percent. Micro test.	Survived and killed 21st day. Necropsy, no plague.
42 (Control)	Flea bite, strain B 3035.	48 hrs. Papule. 72 hrs. Bubo. 78 hrs. Guinea p g sick.	No treatment.		Found dead morning 5th day. Necropsy, plague.
37	Flea bite, strain B 3035.	48 hrs. Two papules, one bubo. 96 hrs. Blood culture negative. 168 hrs. Bubo smaller. 264 hrs. Guinea pig well. Small residual bubo 342 hrs Bubo larger. Guinea pig not very well.	48 hrs. First dose. 3 doses daily for 7 days. 2 doses daily for 1 day. 1 dose daily for 1 day. 342 hrs. First dose (2nd series). 3 doses daily for 2 days. Total treatment 13 days, with 3,200 mg. sulfadiazine, 200 mg. sodium sulfadiazine, 6,000 mg. sodium bicarbonate.	48 hrs. 5.4 mg. percent.	Survived and killed 21st day. Necropsy, no plague.
33 (Control)	Flea bite, strain B 3035.	48 hrs. Papule 54 hrs. Bubo. 96 hrs. Blood culture positive.	No treatment		Death on 6th day. Necropsy, plague.
43	Flea bite, strain B 3035.	48 hrs. Two papules, one bubo. 146 hrs. Bubo very large. Noisy, difficult breathing. 212 hrs. Papules healing. Bubo smaller Breathing still noisy and uneven. Guinea pig fat. 250 hrs. Breathing normal. Bubo small.	48 hrs. First dose. 52 hrs. Second dose. 56 hrs. Third dose. 3 doses daily for 9 days. 2 doses daily for 4 days. Total treatment 14 days, with 3,700 mg. sulfadiazine, 700 mg. sodium sulfadiazine, 7,600 mg. sodium bicarbonate.	96 hrs. 6.0 mg. percent. Micro test.	Survived and killed 21st day. Necropsy, no plague.
41 (Control)	Flea bite, strain B 3035.	48 hrs. Papule. 50 hrs. Bubo. 120 hrs. Two large buboes. Guinea pig thin	No treatment.		Found dead morning 7th day. Necropsy, plague.
40	Flea bite, strain B 3035.	72 hrs. Two papules, two buboes	72 hrs. First dose. 76 hrs. Second dose. 80 hrs. Third dose. 3 doses daily for 1 day. Total treatment 2 days, with 500 mg. sulfadiazine, 400 mg. sodium sulfadiazine, 1,200 mg. sodium bicarbonate.		Found dead morning 5th day. Necropsy, plague.

Protocols of guinea pigs inoculated with P. pestis *or infected by flea bites and treated with sulfadiazine*—Continued

Guinea pig No.	Inoculation	Clinical course from hour of inoculation	Treatment from hour of inoculation	Blood level free sulfadiazine from hour of treatment	Results
39 (Control)	Flea bite, strain B 3035.	72 hrs. Papule. 78 hrs. Bubo.	No treatment.		Found dead morning 6th day. Necropsy, plague.
32	Flea bite, strain B 3035.	48 hrs. Papule and bubo. 66 hrs. Bubo large. 90 hrs. Blood culture positive. 114 hrs. Guinea pig weak and sick. 152 hrs. Guinea pig weak and sick. Buboes smaller. 176 hrs. Guinea pig improved. 272 hrs. Guinea pig fat, buboes small. Throat injured when feeding capsules. Noisy, difficult breathing. 276 hrs. Guinea pig dying.	66 hrs. First dose. 70 hrs. Second dose. 74 hrs. Third dose. 3 doses daily for 6 days. 2 doses daily for 3 days Total treatment 10 days, with 2,600 mg. sulfadiazine. 800 mg. sodium sulfadiazine. 5,400 mg. sodium bicarbonate.	24 hrs. 1.0 mg. percent. 72 hrs. 4.0 mg percent.	Found dead morning 13th day. Necropsy, right inguinal bubo, few *P. pestis*. Lung, liver, spleen, no plague. Cervical cellulitis
31 (Control)	Flea bite, strain B 3035.	48 hrs. Papule and bubo. 90 hrs. Blood culture positive. Bubo very large.	No treatment.		Found dead morning 7th day. Necropsy, plague.
34	Flea bite, strain B 3035.	48 hrs. Papule and bubo. 52 hrs. Guinea pig sick. 72 hrs. Small and large bubo. Edema around large. 120 hrs. Blood culture positive.	52 hrs. First dose. 56 hrs. Second dose. 60 hrs. Third dose. 3 doses daily for 1 day. 2 doses daily for 2 days. Total treatment 4 days, with 900 mg sulfadiazine. 200 mg. sodium sulfadiazine, 1,400 mg. sodium bicarbonate.	68 hrs. 4.0 mg. percent.	Death on 5th day. Necropsy, plague.
35 (Control)	Flea bite, strain B 3035.	48 hrs. Papule and bubo. 52 hrs. Guinea pig sick. 120 hrs. Blood culture positive.	No treatment.		Death on 7th day. Necropsy, plague.
36	Flea bite, strain B 3035.	48 hrs. Papule. 120 hrs. Bubo. 120 hrs. (Before treatment.) Blood culture positive. 150 hrs. Guinea pig sick.	120 hrs. First dose. 124 hrs. Second dose. 128 hrs. Third dose. 3 doses daily for 1 day. Total treatment 2 days, with 400 mg. sulfadiazine, 500 mg. sodium sulfadiazine, 1,200 mg. sodium bicarbonate.		Found dead morning 7th day. Necropsy, plague.
38 (Control)	Flea bite, strain B 3035.	72 hrs. Papule. 120 hrs. Bubo. Blood culture positive.	No treatment.		Death on 7th day. Necropsy, plague.

44	Flea bite, strain B 3035.	48 hrs. 120 hrs. 240 hrs.	Papule and bubo. Bubo large. Bubo small.	48 hrs. First dose. 52 hrs. Second dose. 56 hrs. Third dose. 3 doses daily for 8 days. 2 doses daily for 4 days Total treatment 13 days, with 3,500 mg sulfadiazine, 600 mg. sodium sulfadiazine, 7,000 mg. sodium bicarbonate.	96 hrs. test.	5.5 mg. percent. Micro	Survived and killed 21st day. Necropsy, no plague.
45 (Control)	Flea bite, strain B 3035	48 hrs. 72 hrs. 128 hrs	Papule. Bubo. Guinea pig sick	No treatment			Death on 9th day. Necropsy, plague.
49	Flea bite, strain B 3035.	48 hrs. 72 hrs. 264 hrs	Two papules. Two buboes Buboes very small	72 hrs First dose. 76 hrs Second dose. 80 hrs Third dose 3 doses daily for 7 days. 2 doses daily for 3 days. 1 dose daily for 1 day Total treatment 12 days, with 3,000 mg sulfadiazine, 200 mg sodium sulfadiazine, 5,400 mg sodium bicarbonate	120 hrs.	4.0 mg. percent.	Survived and killed 21st day. Necropsy, no plague.
50	Flea bite, strain B 3035.	48 hrs. 54 hrs. 144 hrs. 336 hrs.	Papule. Bubo. Massive bubo. Bubo small.	54 hrs First dose 3 doses daily for 7 days 2 doses daily for 3 days 1 dose daily for 1 day Total treatment 12 days, with 2,800 mg sulfadiazine, 200 mg sodium sulfadiazine, 5,600 mg. sodium bicarbonate	120 hrs.	7.0 mg. percent.	Survived and killed 21st day. Necropsy, no plague
48 (Control)	Flea bite, strain B 3035.	48 hrs. 72 hrs.	Papule. Bubo.	No treatment			Found dead morning 14th day Necropsy, plague.

COMPLEMENT FIXATION IN THE RICKETTSIAL DISEASES—TECHNIQUE OF THE TEST[1]

By IDA A. BENGTSON, *Senior Bacteriologist, United States Public Health Service*

The complement fixation test has been applied in the study of the following rickettsial diseases: endemic typhus (murine typhus), epidemic typhus (European typhus) (*1, 2, 3*), Rocky Mountain spotted fever (*4*), Tobia fever of Colombia (probably identical with Rocky Mountain spotted fever), and Q fever of North America and Australia (probably identical) (*5*).

The test is quantitative and the present report presents its details more fully than has previously been done. For the sake of economy and convenience the various reagents in amounts of 0.2 cc. are employed. The tests are made in tubes measuring 10–11 × 75 mm. The reagents, except serum dilutions and antigen, are delivered in the tubes by means of an automatic pipette set at 0.2 cc. for salt solution and complement and 0.4 cc. for the mixture of hemolysin and sheep red corpuscles. Serum dilutions are made by means of a syringe pipette. The total volume in each tube is 1 cc.

REAGENTS

The reagents include the usual hemolytic system, with guinea pig complement, antisheep cells rabbit hemolysin, and sheep red blood corpuscles, the antigen, and standard serum.

THE HEMOLYTIC SYSTEM

(*a*) *Sheep's red blood cells.*—The sheep cells are employed in a 2 percent suspension in 0.85 percent physiological salt solution after being washed at least three times so that the supernatant fluid shows no tinge of red. In the hemolysin titration, 0.2 cc. amounts of the 2 percent suspension are used, while in the test proper 0.4 cc. of the mixture of equal volumes of the 2 percent suspension and the proper hemolysin dilution are used.

(*b*) *Hemolysin.*—The hemolysin is prepared by inoculating rabbits with washed sheep cells according to the method of Kolmer (*6*) or Kilduffe (*7*). It is preserved with an equal volume of glycerin.

Titration of hemolysin: The following dilutions are prepared from a 1:100 dilution of hemolysin (2 cc. of a 50 percent glycerinated hemolysin + 98 cc. of 0.85 percent saline): 1:1,000, 1:1,200, 1:1,600, 1:2,000 1:2,400, 1:3,000, 1:4,000, 1:5,000, 1:6,000, 1:8,000, 1:10,000, 1:12,000. These dilutions in 0.2 cc. amounts are transferred to test tubes in duplicate. To each tube is added the following: 0.2 cc. complement diluted 1:40, 0.4 cc. saline, and 0.2 cc. 2 percent sheep red corpuscles.

[1] From the Division of Infectious Diseases, National Institute of Health.

The tubes are shaken individually after the addition of each reagent and incubated in the 37° water bath for 1 hour. The unit of hemolysin is 0.2 cc. of the highest dilution showing complete hemolysis. Two units of hemolysin are used in the test, and, therefore, the dilution of hemolysin to be used is that one which has twice the concentration of the unit (e. g., if the unit is 0.2 of the 1:3,000 dilution, 2 units are contained in 0.2 cc. of the 1:1,500 dilution).

(*c*) *Complement.*—Complement is obtained by bleeding 10 to 15 guinea pigs from the heart and the blood from each guinea pig is collected separately in large test tubes previously rinsed with sterile 0.85 percent salt solution. Care is taken not to cause rupture of the red corpuscles. The needle is removed from the syringe, and the blood allowed to flow slowly into the tube. The tubes are allowed to stand in a refrigerator over-night, and in most of the tubes the clot will have separated from the serum. The serum is removed by means of a Pasteur pipette with a rubber bulb attached. The serums from all the tubes are pooled and then centrifuged to precipitate remaining cells. Tests have been made on various occasions for nonspecific fixability, hemolytic activity, and the presence of natural antisheep hemolysin. Results show that when serums from such a large number of guinea pigs are pooled, these tests are not necessary on individual serums. The complement is preserved by the addition of an amount of saturated NaCl solution equivalent to one-tenth the volume of the serum. The salted complement is kept in the refrigerator and removed only long enough to remove the desired amount of the reagent.

Titration of complement.—The complement is titrated, using a 1:40 dilution prepared as follows: 1 cc. complement, 3 cc. distilled water (to restore tonicity), and 36 cc. 0.85 percent salt solution.

A 0.2 cc. pipette graduated in hundredths is used for measuring the following amounts of diluted complement: 0.08, 0.10, 0.12, 0.14, 0.16, 0.18, 0.20 cc. This is done in duplicate. Sterile 0.85 percent salt solution is added in such amounts that the volume in each tube is 0.4 cc. The antigen in the dilution used in the test is added in amounts of 0.2 cc. The tubes are shaken individually after the addition of each reagent.

The complement mixtures are incubated in the 37° water bath for 1 hour, after which 0.4 cc. of sensitized sheep cells is added (equal parts of 2 percent sheep cells and the dilution of hemolysin which contains 2 units per 0.2 cc., prepared by thorough mixing 10 minutes previously).

Readings are made after a further hour's incubation. The unit is the next to the smallest amount showing complete hemolysis. Two units of complement are used in the test.

ANTIGEN

Antigens are prepared from rickettsiae grown in the yolk sac of fertile hen eggs (method of Cox (*8*)). Only such yolk sacs are used as contain a large number of rickettsiae. This applies to endemic and epidemic typhus and Q fever. The yield of rickettsiae in Rocky Mountain spotted fever is usually less than in the typhus fevers and Q fever, but even though rickettsiae are not numerous, satisfactory antigens have been prepared.

The infected yolk sacs are weighed and ground in a mortar with alundum or in the Waring Blendor without alundum and prepared as 10 percent suspensions with 0.85 percent salt solution containing 1:10,000 merthiolate. After slow centrifugation to remove coarse particles, the supernatant portion is centrifuged in the angle centrifuge at 4,000 r.p.m. for 1 hour. The precipitate is suspended in 0.85 percent sterile saline containing 1:10,000 merthiolate. After standing in 50 cc. centrifuge tubes in the refrigerator for a week or more a considerable amount of precipitate settles out leaving a somewhat turbid suspension. The supernatant portion is pipetted off and this serves as antigen. The antigens as prepared are stable over a period of several months when stored at ice-box temperature. Epidemic typhus vaccine has been successfully employed as antigen in epidemic typhus. Due to the considerable amount of cross fixation it may also be made use of provisionally in testing suspected endemic typhus serums.

Antigens are titrated against a standard positive serum which has been diluted appropriately, and antigen titers have been found to range from 1/8 to 1/128 for epidemic and endemic typhus and somewhat lower for Q fever. Rocky Mountain spotted fever antigens have been used undiluted and diluted ½ and ¼. The titer or unit of the antigen may be considered to be the smallest amount which gives 4+ fixation with the standard serum. Four units of antigen are used in the test.

The serum selected for titrating antigens may be a serum of moderately high titer (1/64 to 1/128) diluted 1/16 or 1/32. Occasional titrations of antigen against one dilution of serum are desirable, or cross titrations of varying dilutions of antigen against varying dilutions of serum may be carried out.

SERUMS

Serums are inactivated at 56° C. for one-half hour. Serum dilutions are prepared with a syringe pipette. Twofold dilutions are used ranging from 1/4 to 1/512, and higher dilutions are made if the end point is not reached. The 1/4 dilution is prepared by adding 0.3 cc. saline to 0.1 cc. serum. Amounts of 0.2 cc. are carried over to the 0.2 cc. amounts of saline contained in the tubes for the higher dilutions.

THE TEST

To the serum dilutions contained in the tubes are added 0.2 cc. of the proper dilution of antigen (4 units) and 0.2 cc. of complement (2 units).

After 1 hour's incubation in the 37° water bath the sensitized sheep cells are added in 0.4 cc. amounts, the hemolysin (2 units per 0.2 cc.) and 2 percent sheep cells having been prepared by thorough mixing 10 minutes previously. After further incubation in the 37° water bath for 1 hour, the test is placed at the cold room temperature and read the following morning. Positive results are recorded as 4, 3, 2, 1+, and trace, and the titer is read as the highest dilution showing 3 or 4+ fixation.

The following controls are set up:

Serum controls. To duplicate tubes of the four lowest dilutions are added the same reagents as for the test except that salt solution is substituted for antigen.

Antigen controls. Antigen controls contain twice the volume of the dilution used in the test, i.e., 0.4 cc., and 0.2 cc. of complement and 0.4 cc. of sensitized cells.

Hemolytic system. The hemolytic system control consists of four tubes containing 0.05, 0.1, 0.15, and 0.2 cc. of the dilution of complement used in the test, these amounts representing ½, 1, 1½, and 2 units. The volume in each tube is made up to 0.6 cc. with sterile saline, and 0.4 cc. sensitized cells added. The tube containing 0.05 should show 1 or 2+ fixation, and the three remaining tubes should be completely hemolyzed.

Standard serum. A standard serum composed of a pooled lot of serums from recovered guinea pigs is titrated with each test, using the same dilutions as for the serums under test.

REFERENCES

(*1*) Bengtson, Ida A.: Complement fixation in endemic typhus. Pub. Health Rep., **56**: 649–653 (1941).

(*2*) Bengtson, Ida A., and Topping, Norman H.: The specificity of the complement fixation test in endemic typhus fever using a rickettsial antigen. Pub. Health Rep., **56**: 1723–1727 (1941).

(*3*) Bengtson, Ida A., and Topping, Norman H.: Complement fixation in rickettsial diseases. Am. J. Pub. Health, **32**: 48–58 (1942).

(*4*) Plotz, Harry, and Wertman, K.: The use of the complement fixation test in Rocky Mountain spotted fever. Science, **93**: 441–442 (1942).

(*5*) Bengtson, Ida A.: Complement fixation in "Q" fever. Proc. Soc. Exper. Biol. and Med., **46**: 665–668 (1941).

(*6*) Kolmer, John A.: The Kolmer complement fixation test for syphilis. In Sup. No. 11 to Venereal Disease Information, pp. 56–72. Public Health Service, 1940.

(*7*) Kilduffe, R. A.: A note upon a method for the preparation of anti-sheep hemolysin. J. Lab. and Clin. Med., **10**: 582–585 (1925).

(*8*) Cox, H. R.: Use of yolk sac of developing chick embryo as medium for growing rickettsiae of Rocky Mountain spotted fever and typhus groups. Pub. Health Rep., **53**: 2241–2247 (1938).

THE ALIPHATIC ALCOHOLS: THEIR TOXICITY AND POTENTIAL DANGERS IN RELATION TO THEIR CONSTITUTION AND THEIR FATE IN METABOLISM[1]

A Review

This study covers a review of the literature on the toxicity and potential dangers of monovalent, bivalent, trivalent, and polyvalent alcohols. Each group is followed by a discussion of the relation of the chemical constitution, physical-chemical properties, and metabolic fate of these alcohols to their toxicological action. The study is based on information gathered from approximately 1,200 publications which are quoted in the bibliography.

DEATHS DURING WEEK ENDED MARCH 11, 1944

[From the Weekly Mortality Index, issued by the Bureau of the Census, Department of Commerce]

	Week ended Mar. 11, 1944	Corresponding week, 1943
Data for 92 large cities of the United States:		
Total deaths	9,526	10,181
Average for 3 prior years	9,685	
Total deaths, first 10 weeks of year	103,505	102,388
Deaths under 1 year of age	597	727
Average for 3 prior years	608	
Deaths under 1 year of age, first 10 weeks of year	6,303	7,284
Data from industrial insurance companies:		
Policies in force	66,357,378	65,413,543
Number of death claims	13,836	14,021
Death claims per 1,000 policies in force, annual rate	10.9	11.2
Death claims per 1,000 policies, first 10 weeks of year, annual rate	11.6	10.8

[1] The aliphatic alcohols: Their toxicity and potential dangers in relation to their constitution and their fate in metabolism. By W. F. von Oettingen. Public Health Bulletin No. 281. Government Printing Office, 1943. (Distributed February 1944.) For sale by the Superintendent of Documents, Washington 25, D. C. Price 35 cents.

PREVALENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED MARCH 18, 1944

Summary

For the second consecutive week the incidence of meningitis for the country as a whole has fallen below that for both the preceding week and the corresponding week of last year. A total of 497 cases was reported, as compared with 517 last week, 614 a year ago, and a 5-year (1939–43) median of 54. The cumulative total for the year to date is 6,087, as compared with 4,659 for the same period last year and 2,689 in 1929, the year of record having the next highest incidence. Currently, increased incidence was reported in 5 of the 9 geographic divisions. Slight decreases occurred in the Middle Atlantic, the East North Central, and the Mountain areas, and the largest decrease in the East South Central area. Nine States reporting more than 20 cases each (last week's figures in parentheses) are as follows: *Increases*—Massachusetts 25 (8), Ohio 29 (26), Michigan 35 (28), Missouri 26 (20), Virginia 24 (17), California 35 (32); *decreases*—New York 55 (67), Pennsylvania 39 (40), Illinois 25 (29).

Slight increases were recorded for measles and scarlet fever, with totals of 32,802 and 7,373 cases, respectively, or 46 percent and 67 percent above the respective corresponding 5-year medians. To date, 240,054 cases of measles and 61,731 cases of scarlet fever have been reported, as compared with 5-year medians of 158,612 and 44,084, respectively. The incidence of these diseases to date is above that for any corresponding period since 1938.

A total of 20 cases of poliomyelitis was reported (7 in California), as compared with 19 last week and a 5-year median of 16.

Incidence below corresponding 5-year medians is reported for diphtheria, influenza, smallpox, typhoid fever, and whooping cough. The cumulative figures for all of these diseases except influenza are also below the respective medians.

A total of 9,537 deaths was recorded in 93 large cities of the United States, as compared with 9,548 for the preceding week and a 3-year (1941–43) average of 9,389. The cumulative total to date is 113,209, as compared with 112,524 for the same period last year.

Telegraphic morbidity reports from State health officers for the week ended March 18, 1944, and comparison with corresponding week of 1943 and 5-year median

In these tables a zero indicates a definite report, while leaders imply that, although none was reported, cases may have occurred.

Division and State	Diphtheria			Influenza			Measles			Meningitis, meningococcus		
	Week ended—		Median 1939–43	Week ended—		Median 1939–43	Week ended—		Median 1939–43	Week ended—		Median 1939–43
	Mar. 18, 1944	Mar. 20, 1943		Mar. 18, 1944	Mar. 20, 1943		Mar. 18, 1944	Mar. 20, 1943		Mar. 18, 1944	Mar. 20, 1943	
NEW ENGLAND												
Maine	2	0	0	------	------	3	247	9	94	2	12	1
New Hampshire	0	0	0	------	------	------	3	13	13	0	0	0
Vermont	0	0	0	2	------	------	173	310	18	0	3	0
Massachusetts	5	5	2	------	------	------	708	1,394	830	25	34	2
Rhode Island	0	1	0	------	------	------	376	14	14	4	24	1
Connecticut	1	0	1	5	3	4	407	418	413	5	3	1
MIDDLE ATLANTIC												
New York	9	21	21	[1] 6	[1] 8	[1] 33	2,925	2,321	1,408	55	64	3
New Jersey	3	3	4	13	15	16	1,366	1,467	443	15	29	1
Pennsylvania	9	10	17	9	3	------	1,258	2,851	1,087	39	32	7
EAST NORTH CENTRAL												
Ohio	6	5	7	19	20	22	3,413	732	196	29	6	2
Indiana	15	2	7	9	3	57	266	403	125	9	5	1
Illinois	8	6	21	117	13	41	1,280	963	645	25	18	4
Michigan [3]	9	8	8	6	27	27	1,651	[illegible]	248	35	7	1
Wisconsin	0	1	2	52	40	200	1,701	1,131	871	5	4	1
WEST NORTH CENTRAL												
Minnesota	4	3	3	1	------	5	1,570	94	179	7	3	0
Iowa	4	0	2	30	------	28	213	332	196	0	0	0
Missouri	3	6	6	3	8	11	474	375	151	26	27	0
North Dakota	2	0	1	22	1	21	245	131	64	3	1	0
South Dakota	2	0	0	------	2	2	75	52	27	0	0	0
Nebraska	3	0	2	4	24	15	70	249	107	0	2	1
Kansas	5	5	3	5	6	13	761	513	513	5	5	1
SOUTH ATLANTIC												
Delaware	0	2	1	------	------	------	15	36	8	0	3	0
Maryland [3]	5	11	5	9	4	41	1,182	73	170	9	25	2
District of Columbia	0	0	5	1	5	5	129	100	83	1	3	1
Virginia	1	7	10	261	792	792	1,235	779	376	24	58	3
West Virginia	2	3	4	40	68	218	566	36	36	12	3	2
North Carolina	7	8	10	14	77	77	2,106	77	921	11	23	1
South Carolina	5	3	3	449	840	774	492	190	190	13	18	0
Georgia	4	4	8	24	152	152	303	187	254	6	9	1
Florida	1	4	4	2	10	10	308	62	119	7	17	0
EAST SOUTH CENTRAL												
Kentucky	8	6	5	56	5	69	86	1,054	91	8	12	2
Tennessee	5	7	6	81	93	161	312	341	165	11	8	2
Alabama	9	5	6	252	158	335	648	226	226	12	10	3
Mississippi [3]	15	5	8	------	------	------	------	------	------	6	44	1
WEST SOUTH CENTRAL												
Arkansas	7	12	7	127	99	291	291	102	102	4	5	0
Louisiana	1	6	6	7	13	27	68	232	154	6	13	1
Oklahoma	6	7	7	155	190	213	88	65	65	4	2	1
Texas	[5] 44	34	36	1,201	1,543	1,543	2,038	1,160	1,160	20	28	4
MOUNTAIN												
Montana	1	2	2	10	24	24	105	343	87	0	0	0
Idaho	0	0	0	37	------	------	72	126	71	0	2	0
Wyoming	2	0	0	1	46	5	116	177	62	1	0	0
Colorado	1	7	8	36	46	46	350	717	247	0	0	0
New Mexico	1	0	2	4	1	5	140	20	37	0	1	0
Arizona	5	4	2	125	68	209	557	47	95	3	1	1
Utah [3]	0	1	1	158	8	8	31	466	155	1	7	0
Nevada	0	0	0	8	21	------	5	27	0	0	1	0
PACIFIC												
Washington	2	3	2	------	1	9	181	947	322	8	9	1
Oregon	5	------	4	45	25	28	102	491	421	6	9	0
California	21	23	23	59	74	211	2,094	742	742	35	29	2
Total	243	240	293	3,465	4,536	6,366	32,802	23,150	22,521	497	619	54
11 weeks	[3] 2,790	3,191	3,542	314,418	49,953	54,065	[4] 240,054	159,593	158,612	6,087	4,659	587

See footnotes at end of table.

Telegraphic morbidity reports from State health officers for the week ended March 18, 1944, and comparison with corresponding week of 1943 and 5-year median—Con.

Division and State	Poliomyelitis			Scarlet fever			Smallpox			Typhoid and paratyphoid fever [6]		
	Week ended—		Median 1939–43	Week ended—		Median 1939–43	Week ended—		Median 1939–43	Week ended—		Median 1939–43
	Mar. 18, 1944	Mar. 20, 1943		Mar. 18, 1944	Mar. 20, 1943		Mar. 18, 1944	Mar. 20, 1943		Mar. 18, 1944	Mar. 20, 1943	
NEW ENGLAND												
Maine	0	0	0	22	20	11	0	0	0	1	0	0
New Hampshire	0	0	0	4	6	3	0	0	0	0	0	0
Vermont	2	0	0	17	8	8	0	0	0	0	0	0
Massachusetts	0	0	0	447	592	169	0	0	0	2	1	1
Rhode Island	0	1	0	14	20	11	0	0	0	0	0	0
Connecticut	0	0	0	96	69	69	0	0	0	0	1	1
MIDDLE ATLANTIC												
New York	0	1	0	623	655	655	0	0	0	5	8	5
New Jersey	0	2	0	288	183	197	0	0	0	0	0	1
Pennsylvania	0	2	0	656	342	342	0	0	0	2	9	8
EAST NORTH CENTRAL												
Ohio	0	0	0	507	327	343	0	5	0	1	3	2
Indiana	0	0	0	225	117	191	0	1	1	1	1	1
Illinois	1	2	0	551	224	446	1	8	8	0	2	2
Michigan [2]	0	0	0	264	96	259	0	0	2	2	1	1
Wisconsin	0	3	1	332	335	186	0	1	3	0	0	0
WEST NORTH CENTRAL												
Minnesota	1	0	0	219	62	88	0	0	2	0	0	0
Iowa	0	0	0	178	94	65	0	1	1	0	1	1
Missouri	1	2	1	173	138	86	0	0	8	3	0	2
North Dakota	0	0	0	71	7	21	0	0	0	1	0	0
South Dakota	0	0	0	34	15	12	0	1	1	0	0	0
Nebraska	2	0	0	86	36	30	0	0	1	0	0	0
Kansas	0	0	0	131	64	67	0	2	1	0	1	0
SOUTH ATLANTIC												
Delaware	0	0	0	16	6	16	0	0	0	0	0	0
Maryland [3]	0	0	0	238	112	47	0	0	0	1	7	1
District of Columbia	0	0	0	222	16	18	0	0	0	0	0	0
Virginia	0	1	0	93	53	36	0	0	0	3	2	2
West Virginia	0	0	0	116	24	46	0	0	0	4	2	2
North Carolina	0	0	0	41	28	34	0	10	0	0	5	0
South Carolina	0	0	0	8	8	5	0	0	0	1	0	0
Georgia	0	0	0	17	6	14	0	0	0	8	2	3
Florida	0	1	1	14	11	8	0	0	0	1	5	3
EAST SOUTH CENTRAL												
Kentucky	0	1	0	77	49	94	0	0	0	3	0	2
Tennessee	0	0	0	96	51	75	0	0	1	0	0	2
Alabama	0	0	0	17	18	23	0	1	1	0	1	2
Mississippi [2]	0	2	0	4	7	6	0	0	0	3	0	1
WEST SOUTH CENTRAL												
Arkansas	0	0	0	12	7	7	0	3	3	2	3	3
Louisiana	0	0	1	17	11	11	0	1	1	1	1	5
Oklahoma	0	0	0	16	27	21	0	0	0	2	1	1
Texas	2	3	1	155	65	65	5	0	2	8	6	6
MOUNTAIN												
Montana	0	0	0	53	6	26	0	0	0	0	0	0
Idaho	1	0	0	109	12	11	0	0	0	0	0	1
Wyoming	0	0	0	8	40	11	0	0	0	0	0	0
Colorado	1	0	0	71	103	51	1	1	1	3	0	0
New Mexico	2	0	0	17	1	5	0	0	0	3	0	0
Arizona	0	1	1	20	16	7	0	0	0	1	0	1
Utah [2]	0	0	0	109	57	29	0	0	0	0	0	0
Nevada	0	0	0	0	6	0	0	0	0	0	0	0
PACIFIC												
Washington	0	1	0	360	46	46	0	0	0	1	1	1
Oregon	0	1	0	156	6	11	1	0	0	0	0	1
California	7	2	2	373	158	170	0	1	1	7	3	5
Total	20	26	16	7,373	4,360	4,426	8	36	65	70	67	87
11 weeks	263	302	287	61,731	42,595	44,084	144	300	521	816	565	834

See footnotes at end of table.

Telegraphic morbidity reports from State health officers for the week ended March 18, 1944, and comparison with corresponding week of 1943 and 5-year median—Con.

Division and State	Whooping cough: Week ended— Mar. 18, 1944	Whooping cough: Week ended— Mar. 20, 1943	Whooping cough: Median 1939–43	Week ended March 18, 1944: Anthrax	Dysentery: Amebic	Dysentery: Bacillary	Dysentery: Unspecified	Encephalitis, infectious	Leprosy	Rocky Mt. spotted fever	Tularemia	Typhus fever
NEW ENGLAND												
Maine	36	67	32	0	0	0	0	0	0	0	0	0
New Hampshire	0	1	5	0	0	0	0	0	0	0	0	0
Vermont	15	23	35	0	0	0	0	0	0	0	0	0
Massachusetts	94	166	171	0	0	2	0	0	0	0	0	0
Rhode Island	0	34	28	0	0	0	0	0	0	0	0	0
Connecticut	38	66	66	0	0	1	0	1	0	0	0	0
MIDDLE ATLANTIC												
New York	121	423	423	0	3	7	0	3	0	0	0	0
New Jersey	42	206	206	1	1	0	0	1	0	0	0	0
Pennsylvania	141	369	361	0	4	0	0	2	0	0	0	0
E. NO. CEN.												
Ohio	80	233	233	0	0	0	3	0	0	0	0	0
Indiana	16	72	45	0	0	0	0	0	0	0	0	0
Illinois	46	153	124	0	0	0	0	0	0	0	0	0
Michigan [2]	120	253	188	0	0	1	0	0	0	0	0	0
Wisconsin	63	209	182	0	0	0	0	0	0	0	0	0
W. NO. CEN.												
Minnesota	26	54	41	0	0	0	0	0	0	0	0	0
Iowa	20	18	15	0	0	0	0	0	0	0	0	0
Missouri	10	22	31	0	0	0	1	1	0	0	0	0
North Dakota	2	12	4	0	0	0	0	0	0	0	0	0
South Dakota	1	1	1	0	0	0	0	0	0	0	0	0
Nebraska	19	11	7	0	0	0	0	0	0	0	0	0
Kansas	28	61	57	0	0	0	0	1	0	0	0	1
SOUTH ATLANTIC												
Delaware	1	1	4	0	0	0	0	0	0	0	0	0
Maryland [2]	59	120	72	0	0	0	0	0	0	0	0	0
District of Columbia	3	26	15	0	0	0	0	0	0	0	0	0
Virginia	74	55	55	0	0	0	26	0	0	0	2	0
West Virginia	45	55	46	0	0	0	0	0	0	0	0	0
North Carolina	115	163	163	0	0	0	0	0	0	0	0	0
South Carolina	61	43	57	0	2	6	0	0	0	0	0	0
Georgia	16	36	36	1	0	1	0	0	0	0	7	5
Florida	14	32	28	0	1	1	0	0	0	0	0	0
E. SO. CEN.												
Kentucky	61	35	51	0	0	0	0	0	0	0	0	0
Tennessee	21	122	40	0	0	0	3	0	0	0	1	0
Alabama	35	49	31	0	0	0	0	0	0	0	1	4
Mississippi [2]				0	0	0	0	0	0	0	0	1
W. SO. CEN.												
Arkansas	7	42	11	0	1	2	0	0	0	0	1	0
Louisiana	0	8	8	0	2	1	0	0	0	0	0	4
Oklahoma	10	23	15	0	0	0	0	1	0	0	0	0
Texas	211	420	208	0	11	125	0	3	0	0	0	18
MOUNTAIN												
Montana	3	12	10	0	0	0	0	0	0	0	0	0
Idaho	8	0	3	0	0	0	0	0	0	0	0	0
Wyoming	6	1	3	0	0	0	0	0	0	0	0	0
Colorado	24	29	36	0	0	0	0	0	0	0	0	0
New Mexico	8	41	16	0	0	0	0	0	0	0	0	0
Arizona	31	23	20	0	0	0	19	0	0	0	0	0
Utah [2]	20	40	87	0	0	0	0	0	0	0	0	0
Nevada	0	0	2	0	0	0	0	0	0	0	0	0
PACIFIC												
Washington	55	25	61	0	0	0	0	0	0	0	0	0
Oregon	36	10	13	0	0	0	0	0	0	0	0	0
California	106	318	286	0	2	5	0	0	1	0	0	1
Total	1,948	4,183	4,024	2	27	152	52	13	1	0	12	34
11 weeks	20,283	42,972	43,609	10	276	2,184	700	115	7	2	113	451
11 weeks, 1943				19	292	2,268	472	115	5	3	190	548

[1] New York City only. [2] Period ended earlier than Saturday.

[3] Later information shows 62 cases of diphtheria in Texas for the week ended March 11, instead of 26 as previously reported.

[4] The following are corrected cumulative figures for measles, respectively, for the first 7, 8, and 9 weeks of the year: 114,762, 141,835, and 176,073.

[5] Including paratyphoid fever cases reported separately as follows: Indiana, 1; Virginia, 1; Georgia, 1; Texas, 1; Washington, 1; California, 3.

WEEKLY REPORTS FROM CITIES

City reports for week ended March 4, 1944

This table lists the reports from 85 cities of more than 10,000 population distributed throughout the United States, and represents a cross section of the current urban incidence of the diseases included in the table.

	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
NEW ENGLAND												
Maine:												
Portland	0	0	------	0	24	0	5	0	17	0	0	1
New Hampshire:												
Concord	0	0	------	0	0	0	2	0	2	0	0	0
Vermont:												
Barre	0	0	------	0	0	0	0	0	1	0	0	0
Massachusetts:												
Boston	5	0	------	0	90	10	10	0	86	0	0	16
Fall River	0	0	------	0	22	0	2	0	3	0	0	1
Springfield	0	0	------	0	54	2	0	0	31	0	0	2
Worcester	0	0	------	0	0	0	9	0	47	0	0	2
Rhode Island:												
Providence	1	1	------	0	259	6	6	0	8	0	0	9
Connecticut:												
Bridgeport	0	0	2	0	30	2	0	0	4	0	0	0
Hartford	0	0	1	0	2	1	0	0	8	0	0	0
New Haven	0	0	------	0	147	3	0	0	6	0	0	6
MIDDLE ATLANTIC												
New York:												
Buffalo	0	0	------	1	4	2	9	0	22	0	0	0
New York	12	0	10	1	1,658	37	84	0	298	0	0	38
Rochester	0	0	------	0	1	3	3	0	7	0	0	2
Syracuse	0	0	------	0	1	0	2	0	3	0	0	11
New Jersey:												
Camden	0	0	------	0	1	0	2	0	31	0	0	0
Newark	0	0	1	1	59	10	4	0	17	0	0	9
Trenton	0	0	1	0	6	1	7	0	8	0	0	0
Pennsylvania:												
Philadelphia	2	0	5	3	53	12	34	0	86	0	0	15
Pittsburgh	0	0	5	5	222	8	25	0	23	0	0	5
Reading	0	0	------	1	5	0	3	0	2	0	0	1
EAST NORTH CENTRAL												
Ohio:												
Cincinnati	2	0	------	0	44	4	3	0	43	0	0	2
Cleveland	0	0	1	0	1,088	9	5	0	61	0	0	18
Columbus	0	0	2	2	191	2	1	0	10	0	0	3
Indiana:												
Fort Wayne	0	0	------	0	0	0	1	0	2	0	2	0
Indianapolis	1	0	------	1	22	8	7	------	54	0	0	10
South Bend	0	0	------	0	2	0	0	0	4	0	0	0
Terre Haute	1	0	------	0	0	0	3	0	0	0	0	0
Illinois:												
Chicago	2	0	3	5	83	29	28	0	190	0	0	9
Springfield	0	0	------	0	42	0	6	0	1	0	0	1
Michigan:												
Detroit	5	0	3	1	75	12	13	0	90	0	1	7
Flint	0	0	------	0	18	0	1	0	2	0	0	1
Grand Rapids	0	0	------	0	230	0	1	0	10	0	0	0
Wisconsin:												
Kenosha	0	0	------	0	2	1	0	0	4	0	0	1
Milwaukee	0	0	2	2	52	6	13	0	94	0	0	23
Racine	0	0	------	0	13	0	1	0	8	0	0	7
Superior	0	0	------	0	3	0	0	0	24	0	0	0
WEST NORTH CENTRAL												
Minnesota:												
Duluth	0	0	------	0	9	0	0	0	20	0	0	12
Minneapolis	1	0	------	1	820	1	7	0	58	0	0	3
St. Paul	0	0	------	0	572	1	5	0	83	0	0	2

See footnotes at end of table.

City reports for week ended March 4, 1944—Continued

	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
WEST NORTH CENTRAL—continued												
Missouri												
Kansas City	1	1	----	3	31	3	15	0	37	0	0	1
St Joseph	0	0	--	0	0	4	0	0	5	0	0	0
St Louis	0	0	10	1	228	20	14	0	29	0	0	4
Nebraska:												
Omaha	2	0	------	0	0	2	11	0	29	0	0	1
Kansas:												
Topeka	0	0	---	1	9	1	3	0	4	0	0	3
Wichita	0	0	1	0	243	1	6	0	1	0	0	0
SOUTH ATLANTIC												
Delaware												
Wilmington	0	0	------	0	6	1	4	0	1	0	0	0
Maryland												
Baltimore	9	0	8	1	706	5	19	0	64	0	1	12
Cumberland	0	0		0	0	0	1	0	0	0	0	0
Frederick	0	0	--	0	0	0	0	0	1	0	0	0
District of Columbia												
Washington	0	0	2	0	136	2	9	0	232	0	0	3
Virginia												
Lynchburg	0	0	5	0	13	0	2	0	0	0	0	1
Richmond	0	0	2	3	188	4	2	0	8	0	0	0
Roanoke	0	0	---	0	126	0	1	0	2	0	0	1
West Virginia:												
Charleston	0	0	-----	0	0	0	0	0	9	0	0	0
Wheeling	0	0	-----	0	2	0	0	0	20	0	0	2
North Carolina:												
Winston-Salem	0	0	1	0	87	0	1	0	3	0	0	3
South Carolina:												
Charleston	0	0	35	0	61	3	2	0	0	0	0	0
Georgia												
Atlanta	0	0	17	0	50	1	3	0	6	0	0	0
Brunswick	1	0	-	0	57	5	1	0	0	0	0	0
Savannah	0	0	3	0	4	0	0	0	0	0	0	0
Florida												
Tampa	0	0	1	0	9	0	1	0	1	0	0	1
EAST SOUTH CENTRAL												
Tennessee												
Memphis	0	0	4	1	12	15	2	0	14	0	0	11
Nashville	0	0	0	2	3	5	3	0	9	0	0	0
Alabama:												
Mobile	0	0	2	0	16	1	3	0	0	0	0	2
WEST SOUTH CENTRAL												
Arkansas:												
Little Rock	0	0	2	0	39	0	1	0	1	0	0	2
Louisiana:												
New Orleans	3	1	8	3	35	8	6	0	5	0	1	0
Shreveport	1	0	------	1	0	1	7	0	1	0	0	0
Texas:												
Dallas	2	0	2	2	85	3	8	0	8	0	0	1
Galveston	0	0	16	0	4	0	1	0	1	0	0	0
Houston	6	0	------	0	49	2	10	0	2	0	1	0
San Antonio	0	0	2	2	12	1	10	0	0	0	0	0
MOUNTAIN												
Montana:												
Billings	0	0	------	0	3	0	1	0	5	0	0	0
Great Falls	2	0	9	0	8	0	1	0	5	0	0	0
Helena	0	0	------	0	1	0	0	0	0	0	0	0
Missoula	0	0	------	0	0	0	1	0	5	0	0	0
Idaho:												
Boise	0	0	------	0	11	0	0	0	10	0	0	0

See footnotes at end of table.

City reports for week ended March 4, 1944—Continued

	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
Colorado:												
Pueblo	0	0	------	0	14	0	2	0	2	0	0	8
Utah:												
Salt Lake City	0	0	------	1	2	0	4	0	35	0	0	3
PACIFIC												
Washington:												
Seattle	0	0	------	0	35	2	5	0	29	0	0	11
Spokane	0	0	------	0	46	0	3	0	15	0	0	2
Tacoma	32	0	------	0	6	1	1	0	73	0	0	1
California:												
Los Angeles	7	0	25	3	172	5	14	1	41	0	1	5
Sacramento	1	0	------	0	9	0	0	0	3	0	0	6
San Francisco	1	0	------	0	38	8	5	0	43	0	0	0
Total	100	3	191	48	8,460	274	486	1	2,222	0	7	296
Corresponding week, 1943	55	2	181	37	4,510	167	532	4	1,398	0	8	1,151
Average, 1939–43	73	------	616	[1] 58	[2] 4,309	------	[1] 518	------	1,517	11	18	1,035

[1] 3-year average, 1941–43.
[2] 5-year median.

Dysentery, amebic.—Cases: New York, 2; Philadelphia, 5; St. Louis, 1; Baltimore, 1; Los Angeles, 1.
Dysentery, bacillary.—Cases. Providence, 1; Buffalo, 8, New York, 1; Philadelphia, 2; Detroit, 1; St. Louis, 1; Richmond, 2; Charleston, S. C., 3; Los Angeles, 1.
Dysentery, unspecified.—Cases: Baltimore, 1; San Antonio, 4.
Tularemia.—Cases· St. Louis, 1.
Typhus fever.—Cases: Charleston, S. C., 1; Mobile, 1; Houston, 1.

Rates (annual basis) per 100,000 population, by geographic groups, for the 85 cities in the preceding table (estimated population, 1942, 34,022,600)

	Diphtheria case rates	Encephalitis, infectious, case rates	Influenza		Measles case rates	Meningitis, meningococcus, case rates	Pneumonia death rates	Poliomyelitis case rates	Scarlet fever case rates	Smallpox case rates	Typhoid and paratyphoid fever case rates	Whooping cough case rates
			Case rates	Death rates								
New England	14.9	2.5	7 5	0.0	1,565	59.8	84.7	0.0	531	0.0	0.0	92
Middle Atlantic	6 3	0.0	9 8	5.4	899	32.6	77 4	0.0	222	0.0	0.0	36
East North Central	6.4	0.0	6.4	6.4	1,092	41.6	49.2	0.0	347	0.0	1.8	48
West North Central	7.9	2.0	21.8	11.9	3,792	65.4	121.1	0.0	528	0.0	0.0	52
South Atlantic	17.4	0 0	128.8	7.0	2,514	36.5	80.0	0.0	604	0.0	1.7	40
East South Central	0.0	0.0	53.8	26.9	278	188.2	71.7	0.0	206	0.0	0.0	117
West South Central	35.3	3.0	88.2	23.5	659	44.1	126.5	0.0	529	0.0	5.9	9
Mountain	33.0	0.0	148.4	16.5	643	0.0	148.4	0.0	1,022	0.0	0.0	99
Pacific	71.9	0.0	43 8	5.3	536	28.0	49.1	1.8	358	0.0	1.8	44
Total	15.4	0.5	29.4	7.4	1,300	42.1	74.7	0.2	341	0.0	1.1	45

TERRITORIES AND POSSESSIONS

Hawaii Territory

Plague (rodent).—Rats proved positive for plague have been found in Hamakua District, Island of Hawaii, T. H., as follows: Paauhau—January 24, 1944, 1 rat, January 27, 1 rat, February 4, 1 rat; Kapulena—February 2, 1 rat, February 9, 1 rat; Kukuihaele—February 2, 1 rat.

Panama Canal Zone

Notifiable diseases—January 1944.—During the month of January 1944, certain notifiable diseases were reported in the Panama Canal Zone and terminal cities as follows:

Disease	Panama		Colon		Canal Zone		Outside the Zone and terminal cities		Total	
	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths
Chickenpox	10		11		4		1		26	
Diphtheria	6	2	1				1		8	2
Dysentery (amebic)		1					1		1	1
Dysentery (bacillary)	2				2		2	1	6	1
Leprosy								1		1
Malaria [1]	13		2		118		56	1	189	1
Measles	1		2		66		1		70	
Meningitis, meningococcus	1								1	
Mumps	10		7		49		2		68	
Paratyphoid fever					3				3	
Pneumonia		7		3	20			2	[2] 20	12
Relapsing fever	1						1		2	
Tuberculosis		24		5	3	1		9	[2] 3	39
Typhoid fever							1		1	
Whooping cough					9			1	[2] 9	1

[1] 62 recurrent cases.
[2] Reported in the Canal Zone only.

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—Week ended February 19, 1944.—During the week ended February 19, 1944, cases of certain communicable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox		9		215	343	58	50	113	281	1,069
Diphtheria		7	6	22	1	2				38
Encephalitis, infectious						1				1
German measles		5		50	29	6	15	7	30	142
Influenza		65	1		94	1			43	204
Measles	1	29		662	568	63	76	241	17	1,657
Meningitis, meningococcus				1	4			2	3	10
Mumps	1	29		83	172	79	8	55	56	483
Scarlet fever		12	1	71	191	57	22	87	83	524
Tuberculosis (all forms)		1	1	87	69	14		14	20	206
Typhoid and paratyphoid fever				7	1			1	1	10
Undulant fever					2					2
Whooping cough		7		58	64	14	2	11	25	181

JAMAICA

Notifiable diseases—4 weeks ended February 12, 1944.—During the 4 weeks ended February 12, 1944, cases of certain notifiable diseases were reported in Kingston, Jamaica, and in the island outside of Kingston, as follows:

Disease	Kingston	Other localities	Disease	Kingston	Other localities
Cerebrospinal meningitis		2	Leprosy		8
Chickenpox	7	35	Poliomyelitis		2
Diphtheria	2	3	Puerperal sepsis		1
Dysentery	3	2	Tuberculosis	25	61
Erysipelas		1	Typhoid fever	11	54

SWEDEN

Notifiable diseases—November 1943.—During the month of November 1943, cases of certain notifiable diseases were reported in Sweden as follows:

Disease	Cases	Disease	Cases
Cerebrospinal meningitis	9	Poliomyelitis	246
Diphtheria	280	Scarlet fever	3,033
Dysentery	98	Syphilis	141
Encephalitis, epidemic	4	Typhoid fever	8
Gonorrhea	1,773	Undulant fever	4
Hepatitis, epidemic	943	Weil's disease	9
Paratyphoid fever	14		

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

NOTE.—Except in cases of unusual incidence, only those places are included which had not previously reported any of the above-named diseases, except yellow fever, during the current year. All reports of yellow fever are published currently.

A table showing the accumulated figures for these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday of each month.

(Few reports are available from the invaded countries of Europe and other nations in war zones.)

Plague

Egypt—Suez.—During the week ended February 26, 1944, 3 cases of plague with 2 deaths were reported in Suez, Egypt.

Smallpox

Egypt—Suez.—During the week ended February 26, 1944, 18 cases of smallpox with 2 deaths were reported in Suez, Egypt.

India—Bombay.—Smallpox continues in epidemic form at Bombay, India. According to official reports for the week ended February 12, 1944, 223 new cases with 102 deaths occurred as compared with 192 cases and 55 deaths reported for the preceding week.

Indochina (French).—For the period January 21–31, 1944, 48 cases of smallpox were reported in French Indochina.

Sudan (French).—For the period January 11–20, 1944, 165 cases of smallpox with 14 deaths were reported in French Sudan.

Turkey.—For the month of December 1943, 1,488 cases of smallpox were reported in Turkey.

Typhus Fever

Bulgaria.—For the period January 6–19, 1944, 80 cases of typhus fever were reported in Bulgaria.

Guatemala.—For the month of January 1944, 155 cases of typhus fever with 27 deaths were reported in Guatemala.

Hungary.—For the 2 weeks ended February 19, 1944, 121 cases of typhus fever were reported in Hungary.

Netherlands.—For the 3 weeks ended January 22, 1944, 5 cases of typhus fever (including 3 cases in Amsterdam) were reported in the Netherlands. For the week ended January 29, 2 cases of typhus fever were reported in Amsterdam.

Union of South Africa—Cape Province.—Information dated March 6, 1944, states that official reports indicate a wide prevalence of typhus fever in Transkei region, Cape Province, practically all among the native population, where 282 cases were reported in one week. The principal outbreaks have occurred more than 300 miles from Port Elizabeth. Precautionary measures are being taken by the Government.

Yellow Fever

Brazil.—Deaths from yellow fever have been reported in Brazil as follows: Amazonas State, Benjamin Constant, December 21, 1943, 1 death; Matto Grosso State—Coronel Ponce, January 15, 1944, 1 death; Cuiaba, January 2, 1 death; January 19, 1 death.

FEDERAL SECURITY AGENCY

UNITED STATES PUBLIC HEALTH SERVICE

THOMAS PARRAN, *Surgeon General*

DIVISION OF PUBLIC HEALTH METHODS

G. ST. J. PERROTT, *Chief of Division*

The PUBLIC HEALTH REPORTS, first published in 1878 under authority of an act of Congress of April 29 of that year, is issued weekly by the United States Public Health Service through the Division of Public Health Methods, pursuant to the following authority of law: United States Code, title 42, sections 7, 30, 93; title 44, section 220.

It contains (1) current information regarding the prevalence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

The PUBLIC HEALTH REPORTS is published primarily for distribution, in accordance with the law, to health officers, members of boards or departments of health, and other persons directly or indirectly engaged in public health work. Articles of special interest are issued as reprints or as supplements, in which forms they are made available for more economical and general distribution.

Requests for and communications regarding the PUBLIC HEALTH REPORTS, reprints, or supplements should be addressed to the Surgeon General, United States Public Health Service, Washington, D. C. Subscribers should remit direct to the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C.

Librarians and others should preserve their copies for binding, as the Public Health Service is unable to supply the general demand for bound copies. Indexes will be supplied upon request.

UNITED STATES GOVERNMENT PRINTING OFFICE WASHINGTON : 1944

For sale by the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C.
Price 5 cents. Subscription price $2.50 a year

Public Health Reports

VOLUME 59 MARCH 31, 1944 NUMBER 13

IN THIS ISSUE

U.S. PUBLIC HEALTH SERVICE
1798

CONTENTS

Public Health Reports

Vol. 59 • MARCH 31, 1944 • *No. 13*

THE ACTION OF PENICILLIUM EXTRACTS IN EXPERIMENTAL TUBERCULOSIS[1]

By M. I. SMITH, *Chief Pharmacologist*, and E. W. EMMART, *Associate Cytologist*, *United States Public Health Service*

Antibiotic substances derived from various strains of *Penicillium* have been reported against a variety of pathogenic micro-organisms (*1*, *2*, *3*, *4*). Raistrick and coworkers (*5*, *6*) have also reported the isolation of an active antibacterial agent, penicillic acid, from the culture medium of *Penicillium cyclopium*, in addition to pigments of the anthraquinone group, notably emodic acid and hydroxyemodine (*7*). More recently a nondiffusible substance of extraordinarily high antibacterial potency has been isolated from culture media of *Penicillium notatum* by adsorption methods and variously named notatin (*8*), penicillin B (*9*), and penatin (*10*), all of which appear to be similar if not identical in nature. With the exception of Robinson's work reporting negative results with penicillin in mouse tuberculosis (*11*), there appears to have been no report on the possible effect of this group of antibiotic substances against the tubercle bacillus.

METHODS AND SCOPE

The present report concerns the action of some of these antibiotics against the tubercle bacillus both *in vitro* and *in vivo*. The tuberculostatic action *in vitro* was ascertained by determining the minimal concentration that will cause nearly complete inhibition of growth on glycerine bouillon medium. The tests were carried out in triplicate in 50 cc. of culture medium to which penicillin, penatin, and extracts of the culture medium of *P. cyclopium* and *P. notatum*, prepared in this laboratory, were added in various concentrations.

Chemotherapeutic tests were carried out *in vivo* both on the chorio-allantoic membranes of the chick embryo and in the guinea pig. The

[1] From the Division of Physiology, National Institute of Health.

chorioallantoic membrane tests were made to ascertain to what extent, if any, these antibiotics could prevent or reduce the extent of tubercle formation on the membrane following implantation of suspensions of tubercle bacilli treated with the drug in question. In these experiments bacillary suspensions were prepared with physiologic saline for the controls, and with definite concentrations of the antibiotics for the treated groups. The volume of the inoculum was uniformly 0.2 cc. and the weight of bacilli 1 mg. At the end of the experimental period of 6 days, the membranes were fixed *in situ*, and the number and size of tubercles noted. In general the technique employed was similar to that previously described (*12*).

In the guinea pig experiments the preparations were administered subcutaneously in suitable doses. Treatment was begun immediately following intraperitoneal inoculation with tubercle bacilli and continued from 2 to 4 weeks. The weight curve, mortality, and extent of tuberculous involvement in the treated animals as compared with the controls were used as an index of the chemotherapeutic efficacy of the substances tested.

A single strain of human tubercle bacilli, A 27, (Henry Phipps Institute) was used in all the experiments.

The preparations tested were:

1. Extracts of culture media of *Penicillium cyclopium* grown on Raulin-Thom medium as suggested by Raistrick and associates (*6*).
2. Extracts of culture media of *Penicillium notatum* similarly grown.
3. Penicillin manufactured by Squibb and Merck and made available by Dr. Chester S. Keefer through contract between the Office of Scientific Research and Development and Massachusetts Memorial Hospital.
4. Penatin which was kindly supplied by Dr. W. Kocholaty, University of Pennsylvania

The first two antibiotics were prepared as follows: The organisms, *P. cyclopium* and *P. notatum*, which were obtained from Dr. Charles Thom, were grown at a temperature of 24° C. on the synthetic Raulin-Thom medium in 2-liter flasks, each containing 350 cc. of the medium. After 14 to 18 days the contents of six flasks were filtered, the pH adjusted to between 2.5 and 3.0 with dilute HCl and extracted for 2 days with 2 liters of ether in a continuous all-glass extraction apparatus. The ether extract was then concentrated by distillation to about 50 cc. and extracted in a small separatory funnel with several portions of 5 to 10 cc. H_2O and a few drops of dilute NaOH, care being taken not to permit the pH of the extract to go above 8. The extracts were then combined, the pH adjusted to 6.6 to 7.0, the ether drawn off *in vacuo*, and the volume of the yellow to brown extract adjusted to 4 cc. to represent the equivalent of one culture flask. For convenience the potency of these extracts is referred to as ¼ unit per cc.

RESULTS

Tuberculostatic action in vitro.—These experiments, summarized in table 1, show that penicillin in concentrations of from 100 to 3,000 Florey units per 100 cc. of glycerine bouillon had no marked inhibitory effect on growth. Similarly 50 to 1,000 units in Proskauer and Beck medium showed no inhibition of growth. Penatin in concentrations as high as 2 mg. per 100 cc. showed no inhibition of growth of tubercle bacilli. The activity of this preparation, according to Dr. W. Kocholaty, was such as to inhibit the growth of *Staphylococcus aureus* in a concentration of 1:100,000,000 in the presence of dextrose.[3] In our experiments 5-percent dextrose was also added to the glycerine bouillon medium as well as to the inoculum in the *in vivo* tests described below.

TABLE 1.—*Tuberculostatic action of* Penicillium *antibiotics in glycerine bouillon*

Preparation	Concentration, per 100 cc.	
	Good growth	Slight or no growth
Penicillin (Squibb)	3,000 units	
Penicillin (Merck)	1,000 units	
Penatin	2 0 mg [1]	
Extract *Penicillium cyclopium*	1 0 unit [2]	
Extract *Penicillium notatum*	0 12 unit	0 25 unit
Do	0 33 unit	1 5 units.
Do	0 5 unit	2.0 units
Penicillium notatum benzoic acid adsorbate	2 8 units [1]	
Penicillium notatum kaolin adsorbate	4 0 units [1]	

[1] Dextrose added to medium
[2] For definition of unit, see text and footnote in table 2

Of the extracts of the culture media of *Penicillium cyclopium* and *P. notatum* prepared in this laboratory the former gave no inhibition while the latter gave good inhibition of growth of tubercle bacilli in glycerine bouillon in concentrations of ¼ to 2 units per 100 cc. These preparations exhibited considerable variation in activity.

Chemotherapeutic effectiveness of Penicillium *extracts on the chorio-allantoic membrane.*—Four experiments were carried out with penicillin, one with penatin, and four with extracts of the culture media from *Penicillium notatum.* These experiments are summarized in table 2. In the experiments with penicillin the drug was administered in 100, 400, 722, and 800 Florey units. Penatin was administered in doses of 0.1 mg. per membrane. The extracts prepared in this laboratory and used in experiments 6, 7, 8, and 9 were administered in units as indicated in table 2, the unit having been designated arbitrarily as the equivalent of one culture flask. In experiments 6, 8, and 9 an aqueous solution of the ether extract was used, while in experiment 7 an aqueous solution of a salicylic acid adsorbate eluted

[3] Personal communication.

with acetone was employed. From 12 to 24 eggs were used for each experiment. The controls were inoculated with the saline suspension of 1 mg. of bacilli; the treated animals received the same amount of bacilli with the drug as indicated.

TABLE 2.—*Effect of* Penicillium *antibiotics on tubercle development on the chorio-allantoic membrane*

C=Control T=Treated

Experiment number	Preparation	Dose in units[1]	Number inoculated		Number survived		Number with lesions		Average number of tubercles per membrane	
			C	T	C	T	C	T	C	T
1	Penicillin (Merck)	100	18	18	11	13	10	12	----	----
2	Penicillin (Squibb)	400	18	18	10	11	10	11	--	--
3	do	722	17	18	15	2	13	2	6 6	2 0
4	do	800	18	18	15	3	15	3	12 0	1 0
5	Penatin (Kocholaty)	0 1 mg	18	24	14	15	14	14	11.5	4.1
6	Extract *Penicillium notatum*	0 65	18	18	13	9	12	9	----	----
7	*Penicillium notatum* salicylic acid adsorbate	0 15	18	22	12	17	12	17	12 1	4.2
8	Extract *Penicillium notatum*	0 20	18	24	10	14	10	14	37 8	12.0
9	do	0 40	24	21	19	16	19	14	-------	-------

[1] Penicillin in Florey units the unit of the extracts is arbitrarily defined as the equivalent of one culture flask of 350 cc medium

The first two experiments given in table 2 show that up to 400 units, penicillin had no inhibiting action. At 722 and 800 units the drug was toxic to the chick embryo, but in the few surviving membranes the average number of tubercles per membrane and their size were reduced In experiment 5, in which 0 1 mg. of penatin was administered, the number of tubercles per membrane and the size of the tubercles were smaller. In the experiments with 0.15, 0.2, and 0.4 units of *Penicillium notatum* extracts prepared in this laboratory, the average number of tubercles per membrane was reduced and the tubercles were smaller in size. The incidence of infection was not decreased in any case.

Chemotherapeutic effectiveness in experimental guinea pig tuberculosis.—In this there were two series of experiments. In the first, 30 guinea pigs of about 300 to 400 gm. were inoculated with 0.5 mg. of A 27 tubercle bacilli intraperitoneally, 10 of which were used as controls and 20, which were divided into two equal groups, were treated daily with ¼ unit of the aqueous solution of the ether extract of *Penicillium notatum* and *Penicillium cyclopium* culture media, respectively. The treatment was continued for a month and the experiment was terminated after 58 days. At this time two died in each of the *cyclopium* and control groups, while all of the *notatum* group survived. All the animals were then killed, and the extent of tuberculous involvement noted and rated on the basis of 0 to 4 according to the amount of tuberculosis present in each of the following organs: omentum and glands, spleen, liver, peritoneum and kidneys, and lungs. The spleens

[illegible]. The results of this experiment, shown in table 3, indicate that treatment with the extract of *Penicillium notatum* had a slightly favorable effect as regards survival, weight gain, extent of tuberculous involvement, and spleen weight. Treatment with extracts of *Penicillium cyclopium* appeared to have no beneficial effect. Macroscopic tuberculosis was present in all animals, the treated as well as the controls.

TABLE 3.—*Effect of treatment with extracts of* Penicillium *on experimental tuberculosis in guinea pigs*

Group	Mortality percent	Average gain in weight (grams)	Average tuberculosis index	Average spleen weight (grams)
Controls	20	83	7.0	4.0
Penicillium cyclopium	20	95	7.1	3.6
Penicillium notatum	0	108	5.5	3.0

In the second series of experiments there were 16 controls and 13 treated animals. The latter were treated once daily with 500 units penicillin (Merck or Squibb) for the first 4 days followed by 200 units daily for the next 12 days. The dose was reduced because four animals died of drug toxicity during the first few days of treatment. Inadequate supply of the material necessitated discontinuance of treatment after 16 days. All the animals in this series weighed from 275 to 325 grams at the time of inoculation when they received an intraperitoneal injection of 1 mg. of tubercle bacilli of the human strain A 27. One of the controls died within a month of inoculation. At 45 days the experiment was terminated. At this time the 15 controls and the 9 surviving treated animals were killed and the extent of tuberculous involvement noted as in the preceding series. Analysis of the data indicated an average tuberculosis index for the controls of 9.8, as against 9.9 for the treated animals. Clearly no beneficial effect whatever could be seen from the penicillin treatment under the experimental conditions outlined. However, the short period of treatment and the rapid elimination of penicillin from the body (*13*) leave the possibility open that more intensive treatment with this substance might yield more favorable results. In view of the present wholly negative results this does not seem very probable.

DISCUSSION

The present experiments indicate that penicillin has no effect on the growth of tubercle bacilli in culture media, and little, if any, effect on the production of tubercles on the chick membrane. In two of the experiments in which large doses of penicillin were introduced with the inoculum on the chick membrane, the size and num-

ber of the tubercles appear to have been reduced, but the high toxicity of the drug rendered the results inconclusive. Similarly, penicillin given to guinea pigs for a limited period did not hinder the course of the disease.

Only a limited amount of penatin was available for our experiments. Although at the concentrations used it was less toxic to the chick membrane than penicillin, the effect in inhibiting tubercle development was slight. It retarded tubercle development on the membrane but did not prevent it.

Lastly, the aqueous solutions of the ether extracts of the medium of *Penicillium notatum* cultures were found to inhibit the growth of tubercle bacilli *in vitro*. These preparations when added to the inoculum and planted on the chorio-allantoic membrane of the chick embryo were nontoxic and appeared to reduce the size and average number of tubercles per membrane. However, the incidence of infection was not affected by doses up to 0.2 units and only slightly reduced at a dosage of 0.4 units.

In the experiment in which 10 guinea pigs received daily ¼ units of the extract of the culture medium *P. notatum* for 1 month, slight inhibition of the progress of the disease was noted at the end of the experimental period of 8 weeks. The slight activity against the tubercle bacillus which was obtained from these extracts is probably to be ascribed to quinones which, in the light of the work of Raistrick and associates (*7*), are almost certainly present. It is to be noted that the Raulin-Thom culture medium used in the cultivation of *P. notatum* is not that used in the preparation of penicillin and penatin. This, as well as differences in preparation, may account in part for the chemotherapeutic differences obtained. At best, the chemotherapeutic activity of these preparations was slight compared with that of some of the sulfones, which have been under investigation in this laboratory (*14*).

SUMMARY AND CONCLUSIONS

Several *Penicillium* antibiotics have been examined for their bacteriostatic action against the tubercle bacillus *in vitro*, for their inhibiting action of tubercle formation on the chorio-allantoic membrane of the chick embryo, and for their chemotherapeutic effectiveness in experimental guinea pig tuberculosis.

Penicillin and penatin were ineffective in inhibiting the growth of the tubercle bacillus *in vitro*. Aqueous solutions of ether extracts of Raulin-Thom culture media of *Penicillium notatum* exhibited *in vitro* marked activity at certain concentrations, while similar extracts of *Penicillium cyclopium* showed none.

All preparations tested appeared to have some activity in reducing

the extent of tubercle formation on the chorio-allantoic membrane without effecting a reduction in the incidence of infection.

Penicillin (Florey) and extracts of culture media of *Penicillium cyclopium* exhibited no effect on experimental tuberculosis in guinea pigs. A slightly favorable effect was obtained with extracts of Raulin-Thom culture media of *Penicillium notatum.*

REFERENCES

(*1*) Fleming, A.: On the antibacterial action of culture of *Penicillium* with special reference to their use in the isolation of *B. influenzae.* Brit. J. Exp. Path., **10:** 226 (1929).

(*2*) Reid, R. D.: Antibacterial action of *Pencillium notatum.* J. Bact., **29:** 215 (1935).

(*3*) Chain, E., Florey, H. W., Gardner, A. D., Heatley, H. G., Jennings, M. A., Orr-Hughing, J., and Sanders, A. G.: Penicillin as a chemotherapeutic agent. Lancet, **239:** 226 (1940).

(*4*) Florey, H. W., and Jennings, M. A.: Some biological properties of highly purified penicillin. Brit. J. Exp. Path., **23:** 120 (1942).

(*5*) Birkenshaw, J. H., Oxford, A. E., and Raistrick, H.: Penicillic acid from *Penicillium puberulum* and *cyclopium.* Biochem. J., **30:** 394 (1936).

(*6*) Oxford, A. E., Raistrick, H., and Smith, G.: Antibacterial substances from moulds. II. Penicillic acid a metabolic product of *Penicillium puberulum* Bainer and *Penicillium cyclopium* Westling. Chem. & Ind., **61:** 22 (1942).

(*7*) Anslow, W. K., Breen, J., and Raistrick, H.: Emodine in *Penicillium cyclopium* Westling. Biochem. J., **34:** 159 (1940).

(*8*) Michaelis, R., Sykes, G., Standfast, A. S. B., Raistrick, H., Coulthard, C. E., Short, W. S., Birkenshaw, G. H., and Skrimshire, G. E. H.: Notatin: an anti-bacterial Glucose aerodehydrogenase from *Penicillium notatum* Westling. Nature, **150:** 634 (1942).

(*9*) Roberts, E. C., Cain, C. K., Muir, R. D., Reithel, F. J., Gaby, W. L., Van Bruggen, J. T., Homan, D. M., Katzman, P. A., Jones, L. R., and Doisy, E. A.: Penicillin B, an anti-bacterial substance from *Penicillium notatum.* J. Biol. Chem., **147:** 47 (1943).

(*10*) Kocholaty, W.: Purification and properties of penatin. Arch. Biochem., **2:** 73 (1943); Science, **97:** 186 (1943).

(*11*) Robinson, H. J.: Toxicity and efficacy of penicillin. J. Pharm. & Exp. Therap., **77:** 70 (1943).

(*12*) Emmart, E. W., and Smith, M. I.: The growth and effects of the tubercle bacillus on the chorio-allantoic membrane of the chick embryo. Pub. Health Rep., **56:** 1277 (1941).

(*13*) Rammelcamp, C. H., and Keefer, C. S.: The absorption, excretion and distribution of penicillin. J. Clin. Invest., **22:** 425 (1943).

(*14*) Smith, M. I., Emmart, E. W., and Stohlman, E. F.: The action of some derivatives of 4–4′ diaminodiphenylsulfone in experimental tuberculosis. Am. Rev. Tuber., **48:** 32 (1943).

ENTOMOLOGICAL PHASES OF THE RECENT DENGUE EPIDEMIC IN HONOLULU [1]

By Robert L. Usinger, *Passed Assistant Sanitarian (R), United States Public Health Service*

INTRODUCTION

Mosquitoes are recent immigrants to Hawaii. Although numbering countless millions, only three species are represented. The night

[1] Presented in the "Symposium on War and Post-War Tropical Medicine", at the annual meeting of the American Society of Tropical Medicine, Cincinnati, Ohio, November 17, 1943.

572609°—44——2

mosquito, *Culex quinquefasciatus* Say, arrived first in the mosquito-free Hawaiian paradise aboard the *Wellington* from Mexico in 1826. There being no native name for mosquitoes, Hawaiian kanakas called them singing flies, only later applying a new name, makika, adapted from our word mosquito. The day mosquitoes, *Aedes aegypti* (Linn.) and *Aedes albopictus* (Skuse), arrived somewhat later. *Aegypti* was widespread in Hawaii when Perkins (*3*) started his collection for the Fauna Hawaiiensis in 1892, whereas *albopictus* "did not come to notice during the earlier days of [his] collecting" but was "very numerous and conspicuous" by 1902.

Fortunately no *Anopheles* mosquitoes have become established in Hawaii, the malaria vectors having stopped, as did most snakes, land mammals, and many forms of aquatic life, at the line which separates the continental islands of Melanesia and the Orient from the truly oceanic islands of Polynesia and Micronesia. Only in the New Hebrides have anophelines crossed this line, but this single crossing suggests that other Pacific islands would be suitable for colonization and fully justifies the efforts being made to exclude *Anopheles* from Hawaii by spraying incoming Army, Navy, and civilian planes.

HISTORY OF MOSQUITO-BORNE DISEASES IN HAWAII

Mosquito-borne diseases have not played an important part in the health history of Hawaii. Extreme isolation, rigid quarantine, and a limited mosquito fauna are responsible for this happy situation. In spite of this combination of circumstances, dengue broke out in Honolulu in 1903. Assistant Surgeon G. W. Wilson of the United States Public Health Service (*12*) reported that the steamer *Doric*, 23 days out of Hong Kong where an epidemic was in progress, arrived on September 11, 1902, with 12 cases of dengue. The first local cases in Honolulu were not recognized until January 1, 1903, but doubtful cases of measles and scarlet fever had been treated in previous weeks. The epidemic spread to all the islands during the following 3 months, reaching its peak in April and May. By December 1, 1903, it had subsided, only an occasional case being reported. Dr. Wilson estimated that 30,000 cases occurred, although most of these were not officially reported.

On October 30, 1911, the *Hong Kong Maru* arrived from Mexico with yellow fever aboard and a local watchman who went aboard the ship came down with the disease at Kalihi Camp on October 30. That there were no secondary cases is doubtless due to the prompt action of health officers. The camp was depopulated, practically denuded, and quarantined, and a general mosquito control program was inaugurated under Passed Assistant Surgeons D. H. Currie and G. W. McCoy and Surgeon Rupert Blue of the United States Public Health Service.

This campaign is still vivid in the minds of older residents because of the furor over eradication of banana plants as mosquito breeding places. Jack Kalakiela will go down in history as "Banana Jack" for his part in the affair which finally resulted in payment by the Territory of Hawaii of over $30,000 in damages to irate citizens.

In 1912, dengue again broke out in Honolulu. Older residents and doctors state that most of the population had dengue but reports are fragmentary, only 108 cases having been reported officially in 1912 when the epidemic must have been at its height. Twenty cases were reported in 1913, 11 in 1914, and 7 in 1915.

The present dengue outbreak is of doubtful origin but the first two cases were reported on July 24, 1943, one in the Waikiki district and one in Nuuanu Valley. One story relates that commercial fliers arrived from the South Pacific early in July and occupied an apartment at a Waikiki rooming house. The maids at this house later came down with what was subsequently suspected of being dengue. By August 8, Waikiki had become such a focus of infection that it was restricted to military personnel. Most of the early cases apparently originated in Waikiki but by September 13 larvicidal work and thorough spraying of adults had practically eliminated *Aedes* mosquitoes from this district so the restriction was lifted. Cases were no longer originating there but were occurring in all other parts of the city. Late in September another major focus developed in the Kakaako district near the center of the city. This grew out of the negligence of a prominent laundry in following up the larvicidal work with regular adult spraying. Only after 70 employees were absent on a single day was action taken. By this time a major focus had developed and cases were reported for the city as a whole at the rate of 100 per week where 10 per week had been the previous average.[2] Three nurses working in the linen department of a maternity hospital served by the laundry came down with dengue, presumably from infected mosquitos carried in bundles, and many other cases, both civilian and military, were traced to this spot.

The disease is fairly typical dengue but the characteristic depressed feeling and the breakbone sensation are less severe than in some epidemics. Blood work was available in only a few cases, the reports showing a mild leucopenia with the white count averaging 4,000. Fifty percent of the cases showed a rash and about half showed the saddleback temperature curve but epidemiologists were so rushed and nurses so busy distributing bed nets to new patients that all such information was gathered on a single visit and hence was incomplete.

---

[2] Since this paper was presented the average number of cases per week has decreased from the peak of 160 to fewer than 25. The total number of cases as of December 31, 1943, has reached 1,340.

Culex quinquefasciatus Say, although not involved in the dengue picture, cannot simply be relegated to the status of a pest mosquito in Hawaii. With filariasis so common in the South Pacific and with the increase of travel under war conditions, *Culex* control is an important precautionary health measure. As elsewhere, *Culex quinquefasciatus* is the foul water breeder of Hawaii. It is almost invariably the species found in street gutter catch basins and in ground pools in air raid shelters. It breeds in great numbers in irrigation water in sugar-cane fields. It ranges much higher than *Aedes* mosquitoes, Swezey and Williams having found it at 5,000 feet on the Island of Hawaii. Captain Sherman of the United States Army found it commonly and almost exclusively in brackish water wells on Ewa Coral Plain, only a very few *albopictus* larvae being mixed with the *Culex*. Mosquitoes captured in a survey of interisland freight and passenger planes proved to be *Culex* which enter the planes at night while mechanics are working.

Aedes aegypti (Linn.) and *albopictus* (Skuse) have been incriminated in various parts of the world as vectors of yellow fever, dengue, equine encephalomyelitis, bird malaria, hemogregarines of geckos, and filariasis of man and dogs.

Systematics.—*Aedes aegypti* (Linn.) belongs to an African section of the subgenus *Stegomyia*, characterized by a pair of crescent-shaped patches of white scales on the mesonotum, a long vertical arm near the bases of the paraprocts, and a terminal spine on the style of the male terminalia. *Albopictus* belongs to an Oriental section, the so-called "*scutellaris* group," of *Stegomyia* in which the mesonotum has a conspicuous median line, the paraprocts lack the vertical arm near the base, and the style has a spine more or less removed from the tip (*1*).

Although very different in appearance, Toumanoff (*10*, *11*) crossed *albopictus* females with *aegypti* males, the progeny all resembling *albopictus*. The reciprocal cross was less successful, only one aegypti-like specimen coming through. These crosses were successful in Indochina but attempts to cross a Calcutta strain of *albopictus* with Indochinese *aegytpi* failed. Attempts to cross the two species in Manila (*8*) also failed.

Aedes aegypti (Linn.) has spread throughout the tropics and most of the subtropics. Because of its domestic habits and its preference for urban environments, it is the dominant species in cities far away from its original African home. *Albopictus*, on the other hand, is confined to the Oriental region with extensions to Madagascar on the southwest and New Guinea and North Australia to the southeast (*1*). The dis-

continuous eastward extension of this species to Hawaii is remarkable and doubtless came about through trans-Pacific shipping.

From a survey of distributional records and a comparison of specimens from various Pacific islands, it appeared that two species had been confused under the name *albopictus* in dengue literature. After an extensive study of material in the National Museum, Dr. Alan Stone confirmed this. He found that his *albopictus* specimens were all from the Oriental region including the Philippine Islands and the Hawaiian Islands. Other Pacific islands to the south and west (New Hebrides, Samoa, Tonga, Fiji, and Guam) had various forms of the closely related *Aedes* (*Stegomyia*) *scutellaris* (Walker). Both *scutellaris* and *albopictus* have been reported from New Guinea and the Philippines. *Scutellaris* resembles *albopictus* in possessing a central silvery stripe on the mesonotum but differs (Stone, *in litt.*) in color pattern and in form of the male terminalia as follows:

Scutellaris: White scales of thoracic pleura arranged in two wavy, parallel lines. Basistyle long and narrow; subterminal spine of dististyle placed some distance from apex, long and at right angles to the dististyle; margin of ninth tergite nearly straight between the lateral lobes. The different subspecies differ in the shape of the basal lobe of the basistyle.

Albopictus: White scales of thoracic pleura arranged in irregular patches. Basistyle short, and stout basally, subtriangular; spine of dististyle placed close to apex, shorter, and more in line with dististyle; ninth tergite with a prominent projection in the middle.

Habits.—Since the time of Carlos Finlay and Walter Reed, a vast amount of detailed information has been accumulated on the life history, habits, and ecologic limits of *aegypti.* Unfortunately, knowledge of the related day mosquitoes of the Australasian and Oriental regions has not kept pace. *Scutellaris* and *albopictus* have simply been compared in a general way to *aegypti* and at least *albopictus* has been described as "similar" to *aegypti* by Robertson and Hu (*4*) in Shanghai. They called it the "tiger mosquito" and reported that it resembles *aegypti* so closely as to be considered identical from the standpoint of control. Actually Hawaiian *albopictus* resembles *aegypti* in the following points:

(1) *Urban breeding habits.*—In Honolulu, *aegypti* was found to outnumber *albopictus* 2 to 1 in 1913, the two species were equal in 1911, and *albopictus* was dominant 4 to 1 in 1912, and up to 12 to 1 in 1914. The ratio of 12 to 1 continued in 1915. In 1926, a survey showed that *albopictus* completely dominated the picture, 42.56 percent as compared with 0 34 percent *aegypti.* During the present epidemic, 85 percent of the day mosquitoes were found to be *albopictus*, only 15 percent being *aegypti.* *Albopictus* was found breeding in town in ant cups, flower pots, tin cans, bottles, a paper box, jars, tires, tanks, and in water plants.

(2) *Day biting.*—A day and night spent up on Mt. Tantalus at 1,700 feet elevation where *albopictus* occurred exclusively and in great numbers proved that this species is a persistent day biter but does not bite at night.

(3) *Egg laying.*—Eggs were most commonly observed at or above the water's edge but specimens of *albopictus* in captivity showed a greater tendency than *aegypti* to oviposit on the surface of the water.

(4) *Short flight range.*—Senior-White (*6*) records a short flight range for *albopictus* in India In the Hawaiian Islands wind trap collections taken by Sakimura at Kunia, Oahu, during the last 3 weeks of September and the first week in October 1943, showed a total of 62 mosquitoes, all of which were *Culex*, no *Aedes* having ventured forth where the wind could pick them up and blow them into traps.

Albopictus also resembles *aegypti* in (5) its silent flight; (6) macroscopic larval appearance and habits, and (7) preference for human blood, Toumanoff (*9*) having found human blood by means of precipitin tests even in mosquitoes which were resting in cattle stables.

Differences between the two species are slight but very important. *Albopictus* was found to have a life cycle scarcely longer (18 days) than *aegypti* (17 days) in the summer season in Shanghai but *albopictus* had a shorter life cycle (24 days) than *aegypti* (27 days) in the winter (*4*). In India, Sen (*5*) found that *albopictus* will bite at a lower temperature (13° C.) than *aegypti* (15° C.). This greater tolerance for cold weather enables *albopictus* to range upward to approximately 2,000 feet in the mountains of the Hawaiian Islands. It is a severe pest throughout the lower forest area, breeding in tree holes and in water at the bases of leaves of plants. The author has found it commonly at 1,700 feet but has found no records of day mosquitoes above the 2,000-foot level. *Aegypti* was once reported from 1,500 feet in the Waianae Mountains (Grimshaw, 1892) but the record seems doubtful considering the present distribution of this species. Since *albopictus* is so perfectly adapted to life in the extensive lower forest zone it may be considered a practical impossibility to eradicate the species from the Hawaiian Islands.

To summarize, *albopictus* is actually dominant over *aegypti* in the city of Honolulu and also thrives beyond the range of *aegypti* in the forest area up to 2,000 feet. Strangely enough, the dominant species where both occur in the Orient appears to be *aegypti* (*6*) so it may be assumed that large Oriental cities on the coastal plain are particularly suitable for *aegypti*. Honolulu is situated at the foot of the Koolau Mountain range with ridges actually extending down into the city. Thus *albopictus*, although breeding in the city, is actually quite close to the mountain forests and is particularly favored in the better residential districts at the moist heads of Nuuanu and Manoa Valleys.

Control.—Control of *Aedes* mosquitoes in Hawaii comprises routine inspection and correction of all breeding places throughout the city, each premise being covered every 10 days. In addition, special educa-

tional activities are conducted, designed to enlist the cooperative support of the householder. This is a basic but rather slow procedure which increases in effectiveness as inspectors become more experienced and as the cumulative effect of clean-up of many premises begins to show results.

Meanwhile, under epidemic conditions, thorough spraying of adults and the spraying inside and out of all premises in and around a focus of several dengue cases became necessary to prevent an explosion of cases. Where foliage had to be sprayed, a pyrethrum and oil spray was used at the rate of 3 parts per 100 of water with Vatsol as an emulsifying agent. Commercial fly spray was used inside of houses.

MOSQUITOES IN RELATION TO DENGUE

The relation of *Aedes* mosquitoes to the present epidemic is rather unique. First, the limited value of a city-wide index as an indication of possible dengue epidemics is evident. Mosquito breeding is very low in certain districts of Honolulu. The general breeding index of 1.7 percent for the first 2 weeks' inspection period is, of course, unusually low because of inexperienced inspectors but a spot survey of various districts throughout the city indicates that it was less than 10 percent during the month of September. This was near the end of the dry season so more breeding places may be expected with the onset of winter rains. Yearly rainfall averages within the city limits range from less than 25 inches to over 100 inches. The breeding index was found to be 83 percent in a spot survey of a very wet district at the head of Nuuanu Valley whereas it was less than 4 percent in a dry and relatively clean area at Waikiki. Such conspicuous variations are of course concealed by a city-wide index.

Curiously, the dengue cases occurred in nearly inverse proportion to the general mosquito breeding index. This apparent anomaly is especially noticeable in the presence of better homes with large gardens and extensive grounds in the wet, mosquito-ridden heads of the valleys, in contrast to small unscreened houses in densely populated areas in the drier parts of the city. Dengue died out without secondary cases under the former conditions in Nuuanu Valley whereas it flourished under congested conditions in the Kakaako district. The correlation of dengue cases with density of human population rather than with density of mosquitoes is due to the short flight range of the mosquitoes, to the presence of more people to be infected in a populous area, and to the dilution factor in mosquito bites when people are few and mosquitoes are present by the thousands.

Dengue epidemics may be eliminated in three ways. In temperate regions the first frost kills all adults outside and stops the epidemic.

In tropical oceanic islands most of the population contracts dengue during an epidemic and the disease gradually disappears, probably because of individual immunity. Finally, dengue may be eliminated by reducing mosquitoes below the threshold of sanitary importance. Since frost does not occur in Honolulu and since it is imperative that such a general involvement of the whole population as in 1903 and 1912 be avoided for military reasons, the third and most difficult course must be pursued in the present epidemic. Spontaneous elimination of dengue depends upon a general lowering of mosquito breeding below the level of sanitary importance. This is the point beyond which mosquitoes are so scarce that, with their short flight range, they do not reach dengue cases during the short period of infectivity of the disease.

At the moment it would appear that prompt reporting and isolation of patients and emergency spraying of local foci to kill infected adult mosquitoes should hold the epidemic at its present relatively low level. Meanwhile, the basic inspectional and correctional program with coincident education of the public should gradually increase in effectiveness so that dengue may possibly be eliminated from Honolulu without having to subject the entire population to the painful and costly process of developing a temporary immunity to the disease.

REFERENCES

(*1*) Edwards, F. W.: Diptera. Fam. Culicidae. Genera Insectorum, 194^{me} Fasc., 1932.

(*2*) Grimshaw, P. H.: Diptera. *In* Fauna Hawaiiensis, Vol. III, Part 6. University Press, Cambridge, England, 1913.

(*3*) Perkins, R. C. L.: Introduction. Fauna Hawaiiensis Vol. I. Part 6, p. clxxxi. University Press, Cambridge, England, 1913.

(*4*) Robertson, R. C., and Hu, Stephen M. K.: The tiger mosquito in Shanghai. China J., 23: 299-306 (1935).

(*5*) Sen, S. K.: Experiments on the transmission of Rinderpest by means of insects. Mem. Dept. Agric. India, Ent. Ser., 9: 59–185 (1927).

(*6*) Senior-White, R.: Three years' mosquito control work in Calcutta. Bull Ent. Res., 25: 551–596 (1934).

(*7*) Siler, J. F., Hall, Milton W., and Hitchens, A. P.: Dengue, its history, epidemiology, mechanism of transmission, etiology, clinical manifestations, immunity and prevention. Philippine J. Sci., 29: 1–304 (1926).

(*8*) Simmons, J. S., St. John, J. H., and Reynolds, F. H. K.: Transmission of dengue fever by *Aedes albopictus* Skuse Philippine J. Sci., 41: 215–229 (1930).

(*9*) Toumanoff, C.: L'épreuve des précipitines appliquée à l'étude des habitudes trophiques chez quelques Culicines d'Extreme-Orient. Bull. Soc. Path. Exot., 28: 943-948 (1935).

(*10*) ————: Essais préliminaries d'intercroisement de St. albopicta Skuse avec St. argentea Poiret s. fasciata Théob. Bull. Soc. Méd.-Chir: Indochine, 15: 964–970 (1937).

(*11*) ————: Les races geographiques de St. fasciata et St. albopicta et leur intercroisement. Bull. Soc. Path. Exot., 32: 505–509 (1939).

(*12*) Wilson, G. W.: Epidemic of dengue in the Territory of Hawaii during 1903. Pub. Health Rep., 19: 67–70 (1904).

THE EFFECT OF A SYNTHETIC MARIHUANA-LIKE COMPOUND ON MUSICAL TALENT AS MEASURED BY THE SEASHORE TEST

By C. Knight Aldrich, *Assistant Surgeon, United States Public Health Service*

Musicians, particularly members of dance orchestras, are reputed to use marihuana for the purpose of enhancing their musical ability. Piel (*1*), in Life Magazine, reports that in the state of marihuana intoxication "the swing musician ascends to new peaks of virtuosity." Medical writers, however, are inclined to question this belief, and Walton (*2*) states that "there is very little probability that an individual's performance is in any degree improved over that of his best capabilities. As judged by objectively critical means, the standards of performance are no doubt lowered." In an endeavor to discover the cause of the common misapprehension, he says: "There is an increased sensitivity to sound and a keener appreciation of rhythm and timing," but he feels that "these phenomena, as judged by objective criteria, probably do not exist except during the early phases of the drug's effects." He suggests that the release of inhibitions by marihuana may result in bringing latent talents to the surface or in evoking a more intense emotional performance. He also recognizes, with Bromberg (*3*) and others, that a subject's evaluation of his own performance is enhanced.

PROCEDURE

The synthesis of the pyra-hexyl compound (1-hydroxy-3-n-hexyl-6,-6,9-trimethyl-7,8,9,10-tetrahydro-6-dibenzopyran) by Professor Adams (*4*) has facilitated the study of marihuana by furnishing a stable drug of uniform potency and consistent effect. Experienced marihuana users report that the psychological effects of this compound are qualitatively identical with those of marihuana. The present experiment was set up to study the effect of this compound on performance as measured by the Seashore tests of musical talents (*5*), in order to determine objectively whether or not marihuana affects musical ability.

The Seashore tests were used because they seemed to offer the most carefully standardized tests available of musical capability. Although they have been criticized for their low reliability and their value in individual diagnosis has been questioned, for group work they are, as Mursell (*6*) says, "outstandingly the most important battery of tests in the field of music."

The six tests are played on phonograph records. The first consists of 50 pairs of notes of progressively diminishing degree of difference in pitch; the subject indicates whether he considers the second note of the pair to be higher or lower than the first. Three other tests are similarly constructed, with differences in loudness, time, and timbre.

Two consist of 30 double series of notes, in one of which the subject decides whether two rhythm patterns are the same or different, and in the last he identifies by number one note which is changed in the second of two otherwise similar tone patterns.

Twelve healthy white male patients volunteered for the experiment. All were serving prison sentences for violation of the Marihuana Tax Act. One was 47 years of age; the ages of the others varied between 23 and 36 years. They had used marihuana from 3 to 18 years with an average of 9½ years. Of the 12 subjects, 2 were professional musicians and 2 had musical ambitions. Each patient was given the test three times, at intervals of 1 week; twice without any drug, and the third trial 4¼ hours after ingestion of 60 mg. of pyra-hexyl compound. This quantity and time were found to produce a "kick" comparable to a satisfying amount of marihuana in most cases, although individual variations were noted.

The average of the results, summarized in table 1, shows improvement in all tests on the second trial and a return to approximately the original level under the influence of pyra-hexyl compound. One exception is seen in the case of rhythm in which the change between the second and third trials is negligible. In general the pyra-hexyl compound seems simply to have obliterated the gain due to practice.

TABLE 1

	Pitch (50)	Loudness (50)	Rhythm (30)	Time (50)	Timbre (50)	Tonal memory (30)
First trial	35.9	39.2	23.4	34.7	41.8	21.2
Second trial	37.2	40.5	24.1	36.7	43.1	23.3
After pyra-hexyl	35.3	39.8	24.2	33.9	41.9	21.8

Average number correct · 12 patients.

The Seashore test measures only sensory musical capacity and leaves out of account factors such as motor speed and coordination, release of inhibitions and fatigability, which could conceivably influence the playing of present-day music. The subjective reports, however, emphasize the extent of the self-deception brought out by marihuana. Eight of the patients, when asked if they noticed any differences in their own performances, felt sure that they had improved with marihuana; 3 felt that they remained the same, and 1 "couldn't say." Actually, 9 out of 12 subjects achieved lower scores on the third than on the second trials.

Subject D, a professional saxophone player, said after the third trial, "I am convinced I was better * * * I'm sure the medicine helped; I know it does on my horn as I hear the notes more distinctly." He stated that the medicine made him " 'high' but not quite to the

peak—about three-fourths I'd say." His scores, indicating in general a poorer performance with the drug, are shown in table 2.

TABLE 2

	Pitch (50)	Loudness (50)	Rhythm (30)	Time (50)	Timbre (50)	Tonal memory (30)
First trial	33	43	26	39	44	27
Second trial	40	47	24	39	47	29
After pyra-hexyl	33	46	26	35	44	27

Patient "D" number correct

SUMMARY OF RESULTS

No improvement was observed in the musical capability, as tested by the Seashore measures of musical talents, of 12 former users of marihuana after ingestion of satisfying amounts of pyra-hexyl compound, a synthetic, marihuana-like substance.

Although 9 out of 12 subjects achieved poorer scores after using the drug than on the previous trial, 8 out of 12 expressed the opinion that their scores had improved, and none recognized a loss in efficiency.

CONCLUSION

Pyra-hexyl compound, a marihuana-like synthetic, appears to improve an individual's subjective impression of his own musical ability rather than the ability per se as measured by the Seashore test.

REFERENCES

(*1*) Piel, Gerard: Narcotics. Life Magazine, **15** (3): 15–82 (July 19, 1943).

(*2*) Walton, Robert P.: Marihuana, America's New Drug Problem. Lippincott, Philadelphia, 1938.

(*3*) Bromberg, Walter: Marihuana, a psychiatric study. J. Am. Med. Assoc., **113**: 4 (1939).

(*4*) Adams, R.: Marihuana (Harvey Lecture). Bull. N. Y. Acad. Med., **18**: 1705 (1942).

(*5*) Seashore, Carl E.: Psychology of Music. McGraw-Hill, New York, 1938.

(*6*) Mursell, James L.: Psychology of Music. Norton, New York, 1937.

DEATHS DURING WEEK ENDED MARCH 18, 1944

[From the Weekly Mortality Index, issued by the Bureau of the Census, Department of Commerce]

	Week ended Mar. 18, 1944	Corresponding week, 1943
Data for 93 large cities of the United States:		
Total deaths	9,537	9,949
Average for 3 prior years	9,389	
Total deaths, first 11 weeks of year	113,209	112,524
Deaths under 1 year of age	678	711
Average for 3 prior years	614	
Deaths under 1 year of age, first 11 weeks of year	6,984	8,016
Data from industrial insurance companies:		
Policies in force	66,373,891	65,444,262
Number of death claims	13,891	13,266
Death claims per 1,000 policies in force, annual rate	10.9	10.6
Death claims per 1,000 policies, first 11 weeks of year, annual rate	11.5	10.7

PREVALENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED MARCH 25, 1944

Summary

Following a decline for 2 successive weeks, the incidence of meningoccus meningitis increased during the current week. A total of 550 cases was reported, as compared with 497 last week. For the third consecutive week, however, the incidence is below the comparable figure for last year; but the cumulative total to date is 6,637, as compared with 5,231 for the same period last year and a 5-year median (1939–43) of 638

Sixteen States reporting currently more than 10 cases each (last week's figures in parentheses) are as follows. *Increases*—New York 56 (55), New Jersey 20 (15), Ohio 37 (29), Illinois 44 (25), Minnesota 11 (7), Missouri 27 (26), Virginia 37 (24), North Carolina 13 (11), Georgia 11 (6), Florida 15 (7), Tennessee 33 (11), California 47 (35); *decreases*—Massachusetts 11 (25), Pennsylvania 27 (39), Texas 11 (20); *no change*—Michigan 35 (35).

As compared with last week, decreased incidence was recorded for measles and scarlet fever. The totals reported (32,271 cases of measles and 7,356 of scarlet fever) are, however, 32 and 72 percent above the respective 5-year medians, and the cumulative figures for the year to date (272,325 and 69,087) are 49 and 43 percent above the respective medians for the corresponding periods of the past 5 years.

Current figures for diphtheria, influenza, poliomyelitis, and whooping cough are below those for last week, while the reported cases of smallpox (8) are the same for the 2 weeks. A total of 76 cases of typhoid fever was reported, as compared with 70 last week. The cumulative figure to date for each of these six diseases is below the corresponding 5-year medians.

Cumulative totals of other diseases included in the following table (last week's figures in parentheses) are as follows: Anthrax 11 (19), dysentery, all forms, 3,414 (3,303), encephalitis, infectious, 126 (127), leprosy 8 (5), Rocky Mountain spotted fever 2 (3), tularemia 125 (205), endemic typhus fever 475 (597).

A total of 9,605 deaths was recorded in 93 large cities of the United States, as compared with 9,532 last week and a 3-year (1941–43) average of 9,342. The cumulative total to date is 122,809, as compared with 122,503 for the same period last year.

Telegraphic morbidity reports from State health officers for the week ended March 25, 1944, and comparison with corresponding week of 1943 and 5-year median

In these tables a zero indicates a definite report, while leaders imply that, although none was reported, cases may have occurred.

Division and State	Diphtheria			Influenza			Measles			Meningitis, meningococcus		
	Week ended		Median 1939–43	Week ended		Median 1939–43	Week ended		Median 1939–43	Week ended		Median 1939–43
	Mar. 25, 1944	Mar. 27, 1943		Mar. 25, 1944	Mar. 27, 1943		Mar. 25, 1944	Mar. 27, 1943		Mar. 25, 1944	Mar. 27, 1943	
NEW ENGLAND												
Maine	1	0	0	2	2	2	319	5	118	5	20	1
New Hampshire	0	0	0	---	1	1	10	29	29	0	1	0
Vermont	0	0	0	1	---	---	155	387	24	0	1	0
Massachusetts	3	1	1		---	---	782	1,706	929	11	30	4
Rhode Island	1	0	0	18	---	---	231	31	31	3	29	0
Connecticut	1	0	0	2	4	6	502	349	349	7	7	0
MIDDLE ATLANTIC												
New York	15	30	30	[1] 6	[1] 12	[1] 28	3,427	2,413	1,615	56	51	5
New Jersey	2	6	4	10	15	15	1,515	1,526	672	20	38	2
Pennsylvania	9	10	13	9	2	---	940	2,362	1,206	27	44	7
EAST NORTH CENTRAL												
Ohio	6	2	6	22	16	14	2,487	634	260	37	7	0
Indiana	3	4	11	7	23	38	315	262	155	9	9	1
Illinois	14	12	23	61	17	35	1,092	1,262	741	44	14	2
Michigan [2]	10	3	3	6	20	19	1,127	904	289	35	24	2
Wisconsin	5	6	1	85	41	184	2,316	1,260	886	8	3	1
WEST NORTH CENTRAL												
Minnesota	7	5	0	3	1	2	1,467	121	211	11	4	0
Iowa	1	1	3	---	---	9	239	393	198	1	0	0
Missouri	4	2	5	3	5	8	414	586	384	27	19	2
North Dakota	0	0	1	28	9	9	146	61	61	0	1	0
South Dakota	2	2	1	---	---	1	55	202	14	0	0	0
Nebraska	2	0	2	1	3	7	110	349	165	2	2	0
Kansas	5	12	6	4	11	12	863	760	628	7	5	0
SOUTH ATLANTIC												
Delaware	1	0	0	---	---	---	6	136	7	1	1	0
Maryland [2]	8	3	2	4	6	19	1,076	91	196	5	17	1
District of Columbia	0	0	2	3	1	2	153	91	88	2	6	1
Virginia	2	8	8	480	404	524	1,355	692	524	37	33	4
West Virginia	2	3	6	3	20	67	447	73	73	7	1	2
North Carolina	8	9	9	7	180	73	1,899	111	1,028	13	14	2
South Carolina	0	6	6	515	920	666	524	127	127	7	13	1
Georgia	5	5	8	51	79	141	428	298	216	11	7	2
Florida	2	1	2	5	14	14	385	65	171	15	3	1
EAST SOUTH CENTRAL												
Kentucky	2	3	4	82	14	38	89	752	137	5	13	4
Tennessee	3	3	3	74	96	117	218	401	118	33	9	1
Alabama	3	13	6	62	264	269	462	342	342	8	8	2
Mississippi [2]	2	1	3	---	---	---	---	---	---	6	23	1
WEST SOUTH CENTRAL												
Arkansas	5	4	6	105	114	187	202	96	96	5	4	1
Louisiana	6	2	8	60	10	10	334	197	120	6	14	2
Oklahoma	2	3	6	141	76	165	89	74	74	2	8	1
Texas	37	41	35	964	1,243	1,277	2,003	1,359	1,250	11	20	2
MOUNTAIN												
Montana	1	0	2	17	43	14	194	320	53	4	0	0
Idaho	0	0	0	---	5	---	50	101	92	0	2	0
Wyoming	2	0	1	20	40	3	114	191	71	0	1	0
Colorado	2	15	9	41	19	23	367	772	238	1	3	0
New Mexico	0	1	1	18	3	15	79	32	68	0	0	1
Arizona	3	0	0	106	138	173	357	53	53	0	0	0
Utah [2]	0	2	1	204	11	22	30	354	266	0	2	0
Nevada	0	0	0	0	---	0	1	50	10	0	0	0
PACIFIC												
Washington	1	2	1	84	6	6	212	686	668	6	8	1
Oregon	1	1	2	30	34	34	98	438	438	8	10	0
California	23	24	16	85	91	181	2,584	1,127	1,127	47	43	5
Total	212	246	272	3,379	4,016	4,438	32,271	24,632	24,415	550	572	52
12 weeks	3,002	3,437	3,814	317,797	53,969	100,056	272,325	184,225	183,027	6,637	5,281	638

See footnotes at end of table.

Telegraphic morbidity reports from State health officers for the week ended March 25, 1944, and comparison with corresponding week of 1943 and 5-year median—Con.

Division and State	Poliomyelitis, Week ended Mar. 25, 1944	Poliomyelitis, Week ended Mar. 27, 1943	Poliomyelitis, Median 1939–43	Scarlet fever, Week ended Mar 25, 1944	Scarlet fever, Week ended Mar 27, 1943	Scarlet fever, Median 1939–43
NEW ENGLAND						
Maine	0	0	0	64	6	12
New Hampshire	0	0	0	13	22	4
Vermont	0	0	0	10	21	7
Massachusetts	0	2	0	443	606	194
Rhode Island	0	0	0	15	17	16
Connecticut	0	0	0	129	78	78
MIDDLE ATLANTIC						
New York	1	0	0	646	587	587
New Jersey	0	0	0	295	160	225
Pennsylvania	1	2	0	689	323	377
EAST NORTH CENTRAL						
Ohio	0	1	0	490	249	261
Indiana	0	0	0	244	76	182
Illinois	0	0	0	532	210	503
Michigan [2]	0	0	0	283	126	284
Wisconsin	0	1	0	461	294	148
WEST NORTH CENTRAL						
Minnesota	0	0	0	208	41	82
Iowa	0	0	0	168	67	69
Missouri	0	0	0	161	110	110
North Dakota	0	0	0	45	3	7
South Dakota	0	0	0	27	18	18
Nebraska	0	0	0	102	34	31
Kansas	1	0	0	106	96	96
SOUTH ATLANTIC						
Delaware	0	0	0	23	11	14
Maryland [2]	0	0	0	230	107	55
District of Columbia	0	0	0	155	20	20
Virginia	1	0	0	159	55	40
West Virginia	0	0	0	96	39	39
North Carolina	0	0	0	26	26	26
South Carolina	0	0	0	9	10	5
Georgia	0	1	1	21	14	14
Florida	0	1	1	15	4	8
EAST SOUTH CENTRAL						
Kentucky	0	0	0	63	55	90
Tennessee	1	0	0	64	40	47
Alabama	0	0	1	12	17	17
Mississippi [2]	0	0	0	22	16	6
WEST SOUTH CENTRAL						
Arkansas	0	0	1	15	16	6
Louisiana	1	0	0	13	10	10
Oklahoma	0	0	1	18	14	20
Texas	4	8	1	81	36	49
MOUNTAIN						
Montana	0	0	0	58	6	21
Idaho	0	0	0	37	3	5
Wyoming	0	0	0	17	57	9
Colorado	0	0	0	60	57	37
New Mexico	0	0	0	14	2	6
Arizona	0	0	0	15	25	8
Utah [2]	0	1	0	149	61	22
Nevada	0	0	0	1	1	0
PACIFIC						
Washington	1	0	0	361	42	45
Oregon	0	0	1	151	19	18
California	3	1	2	340	200	177
Total	14	18	24	7,356	4,107	4,269
12 weeks	277	320	311	69,087	46,702	48,344

Division and State	Smallpox, Week ended Mar. 25, 1944	Smallpox, Week ended Mar. 27, 1943	Smallpox, Median 1939–43	Typhoid and paratyphoid fever, Week ended Mar. 25, 1944	Typhoid and paratyphoid fever, Week ended Mar. 27, 1943	Typhoid and paratyphoid fever, Median 1939–43
NEW ENGLAND						
Maine	0	0	0	1	0	0
New Hampshire	0	0	0	0	0	0
Vermont	0	0	0	0	0	0
Massachusetts	0	0	0	0	0	0
Rhode Island	0	0	0	0	0	0
Connecticut	0	0	0	0	0	0
MIDDLE ATLANTIC						
New York	0	0	0	5	6	4
New Jersey	0	0	0	1	1	1
Pennsylvania	0	0	0	8	2	5
EAST NORTH CENTRAL						
Ohio	1	1	1	2	2	3
Indiana	1	4	4	3	4	3
Illinois	0	1	2	1	3	3
Michigan [2]	0	0	1	3	5	2
Wisconsin	1	0	0	0	2	0
WEST NORTH CENTRAL						
Minnesota	0	0	3	1	0	0
Iowa	0	0	4	0	0	1
Missouri	0	0	6	4	2	2
North Dakota	0	0	1	0	0	0
South Dakota	1	0	0	0	0	0
Nebraska	0	0	0	0	0	0
Kansas	0	0	0	3	0	1
SOUTH ATLANTIC						
Delaware	0	0	0	0	0	0
Maryland [2]	0	0	0	0	0	0
District of Columbia	0	0	0	0	0	0
Virginia	0	0	0	1	1	2
West Virginia	0	0	0	6	0	2
North Carolina	0	3	0	2	5	2
South Carolina	1	0	0	1	0	1
Georgia	0	0	0	3	1	3
Florida	0	0	0	5	1	2
EAST SOUTH CENTRAL						
Kentucky	0	2	1	3	0	1
Tennessee	1	0	1	0	1	1
Alabama	0	0	1	0	1	2
Mississippi [2]	0	1	0	1	1	3
WEST SOUTH CENTRAL						
Arkansas	0	1	2	2	2	2
Louisiana	0	0	0	10	6	3
Oklahoma	1	3	2	0	1	1
Texas	0	2	4	9	2	8
MOUNTAIN						
Montana	0	0	0	0	0	0
Idaho	0	0	0	0	0	0
Wyoming	0	0	0	0	0	1
Colorado	0	1	1	0	0	0
New Mexico	0	0	0	1	1	1
Arizona	0	0	0	0	2	0
Utah [2]	0	0	0	0	0	0
Nevada	0	0	0	0	0	0
PACIFIC						
Washington	1	0	1	1	0	1
Oregon	0	0	0	1	0	1
California	0	0	0	8	1	3
Total	8	19	36	76	53	82
12 weeks	152	219	282	802	628	916

See footnotes at end of table.

Telegraphic morbidity reports from State health officers for the week ended March 25, 1944, and comparison with corresponding week of 1943 and 5-year median—Con.

Division and State	Whooping cough: Week ended Mar. 25, 1944	Whooping cough: Week ended Mar. 27, 1943	Whooping cough: Median 1939–43	Week ended Mar. 25, 1944: Anthrax	Dysentery: Amebic	Dysentery: Bacillary	Dysentery: Unspecified	Encephalitis, infectious	Leprosy	Rocky Mt. spotted fever	Tularemia	Typhus fever
NEW ENGLAND												
Maine	13	37	43	0	0	0	0	0	0	0	0	0
New Hampshire	1	3	3	0	0	0	0	0	0	0	0	0
Vermont	45	16	32	0	0	0	0	0	0	0	0	0
Massachusetts	97	232	232	0	0	0	0	0	0	0	0	0
Rhode Island	9	50	49	0	0	0	0	0	0	0	0	0
Connecticut	27	57	59	0	0	0	0	0	0	0	0	0
MIDDLE ATLANTIC												
New York	130	368	382	0	1	5	0	4	0	0	0	1
New Jersey	45	227	227	0	4	0	0	1	0	0	0	0
Pennsylvania	100	321	292	0	10	0	0	0	0	0	0	0
EAST NORTH CENTRAL												
Ohio	75	167	167	1	0	0	0	0	0	0	0	0
Indiana	5	34	41	0	0	0	0	0	0	0	0	0
Illinois	45	138	138	0	0	1	0	1	0	0	0	0
Michigan [2]	43	233	199	0	0	1	0	0	0	0	0	0
Wisconsin	69	192	146	0	0	0	0	0	0	0	0	0
WEST NORTH CENTRAL												
Minnesota	21	76	43	0	2	0	0	0	0	0	0	0
Iowa	11	27	19	0	0	0	0	0	0	0	0	0
Missouri	12	30	27	0	0	0	0	0	0	0	0	0
North Dakota	2	17	9	0	0	0	0	0	0	0	0	0
South Dakota	1	0	2	0	0	0	0	0	0	0	0	0
Nebraska	31	10	10	0	0	0	0	0	0	0	0	0
Kansas	30	65	39	0	0	0	0	0	0	0	1	0
SOUTH ATLANTIC												
Delaware	0	11	11	0	0	0	0	0	0	0	0	0
Maryland [2]	36	91	91	0	0	0	0	1	0	0	0	0
District of Columbia	2	33	19	0	0	0	0	0	0	0	0	0
Virginia	74	48	48	0	0	0	31	0	0	0	3	1
West Virginia	11	16	27	0	0	0	0	0	0	0	0	0
North Carolina	170	151	152	0	0	0	0	0	0	0	0	0
South Carolina	75	52	57	0	0	8	0	0	0	0	0	0
Georgia	10	33	29	0	0	0	0	0	0	0	3	5
Florida	27	14	20	0	2	0	0	0	0	0	0	3
EAST SOUTH CENTRAL												
Kentucky	68	31	53	0	0	0	0	0	0	0	0	0
Tennessee	10	125	29	0	0	0	3	0	0	0	2	0
Alabama	25	43	40	0	1	0	0	0	0	0	0	1
Mississippi [2]	-----	-----	-----	0	0	0			0	0	2	2
WEST SOUTH CENTRAL												
Arkansas	4	46	20	0	3	0	0	0	0	0	0	0
Louisiana	0	4	7	0	0	4	0	0	1	0	1	0
Oklahoma	10	27	22	0	0	0	0	1	0	0	0	0
Texas	189	451	255	0	9	136	0	0	0	0	0	10
MOUNTAIN												
Montana	9	8	5	0	0	0	0	0	0	0	0	0
Idaho	0	0	9	0	0	0	0	0	0	0	0	0
Wyoming	7	1	1	0	0	0	0	0	0	0	0	0
Colorado	38	20	20	0	0	0	0	0	0	0	0	0
New Mexico	1	8	12	0	0	1	0	1	0	0	0	0
Arizona	31	19	27	0	0	0	11	0	0	0	0	0
Utah [2]	39	46	46	0	0	0	0	0	0	0	0	0
Nevada	0	1	0	0	0	0	0	0	0	0	0	0
PACIFIC												
Washington	63	27	72	0	0	0	0	0	0	0	0	0
Oregon	14	12	18	0	0	0	0	0	0	0	0	0
California	101	435	319	0	9	12	0	2	0	0	0	1
Total	1,826	4,053	4,053	1	41	168	45	11	1	0	12	24
12 weeks	22,109	47,025	47,291	11	317	2,352	745	126	8	2	126	475

[1] New York City only.
[2] Period ended earlier than Saturday.

WEEKLY REPORTS FROM CITIES

City reports for week ended March 11, 1944

This table lists the reports from 87 cities of more than 10,000 population distributed throughout the United States, and represents a cross section of the current urban incidence of the diseases included in the table.

	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
NEW ENGLAND												
Maine:												
Portland	0	0	------	0	21	0	5	0	9	0	0	1
New Hampshire:												
Concord	0	0	------	0	0	0	1	0	2	0	0	0
Vermont:												
Barre	0	0	------	0	0	0	0	0	0	0	0	0
Massachusetts:												
Boston	2	0	------	0	56	9	14	0	77	0	1	15
Fall River	0	0	------	2	11	1	1	0	9	0	0	0
Springfield	0	0	------	0	43	0	0	0	36	0	0	12
Worcester	0	0	------	0	2	1	7	0	94	0	0	4
Rhode Island:												
Providence	0	1	------	0	216	1	6	0	6	0	0	1
Connecticut:												
Bridgeport	0	0	------	0	35	0	0	0	6	0	0	0
Hartford	0	0	------	0	3	1	1	0	23	0	1	0
New Haven	0	0	------	0	107	1	1	0	3	0	0	2
MIDDLE ATLANTIC												
New York:												
Buffalo	0	0	------	1	4	1	2	0	18	0	0	2
New York	12	1	9	2	1,800	37	80	2	379	0	1	29
Rochester	0	0	------	0	4	6	1	0	0	0	0	3
Syracuse	0	0	------	0	4	0	3	0	11	0	0	14
New Jersey:												
Camden	0	0	------	0	6	0	2	0	49	0	0	0
Newark	0	0	3	1	75	6	4	0	21	0	0	1
Trenton	0	0	2	0	10	2	2	0	11	0	0	0
Pennsylvania:												
Philadelphia	1	0	3	1	23	8	42	0	100	0	1	17
Pittsburgh	0	0	4	5	131	3	19	1	27	0	1	6
Reading	0	0	------	0	5	0	3	0	5	0	0	1
EAST NORTH CENTRAL												
Ohio:												
Cincinnati	1	0	------	1	55	3	6	0	38	0	0	2
Cleveland	0	0	3	3	831	5	10	0	82	0	0	12
Columbus	0	0	3	3	163	1	7	0	11	0	0	11
Indiana:												
Fort Wayne	0	0	------	0	9	0	1	0	4	0	1	1
Indianapolis	1	0	------	1	34	6	9	0	60	0	0	4
South Bend	0	0	------	0	4	0	0	0	5	0	0	0
Terre Haute	0	0	------	0	0	0	2	0	0	0	0	0
Illinois:												
Chicago	1	0	3	1	78	17	22	0	200	0	0	18
Springfield	0	0	------	0	96	0	2	0	2	0	0	2
Michigan:												
Detroit	5	0	4	2	100	14	26	0	86	0	1	7
Flint	0	0	------	0	28	0	0	0	4	0	0	6
Grand Rapids	0	0	------	0	286	0	0	0	6	0	0	1
Wisconsin:												
Kenosha	0	0	------	0	2	0	0	0	3	0	0	5
Milwaukee	1	0	------	0	76	4	5	0	63	0	0	14
Racine	0	0	------	1	4	0	1	0	6	0	0	6
Superior	0	0	------	0	4	0	0	1	18	0	0	0
WEST NORTH CENTRAL												
Minnesota:												
Duluth	0	0	------	0	19	0	3	0	16	0	0	4
Minneapolis	3	0	------	0	681	4	6	0	41	0	0	1
St. Paul	0	0	------	0	696	1	9	0	43	0	0	1

City reports for week ended March 11, 1944—Continued

	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
WEST NORTH CENTRAL—continued												
Missouri												
Kansas City	0	0	------	0	31	2	8	0	43	0	0	1
St Joseph	0	0	--	0	0	0	0	0	4	0	0	0
St Louis	0	0	5	1	287	13	13	0	31	0	0	3
North Dakota												
Fargo	0	0	-- -	0	9	0	0	0	12	0	0	0
Nebraska												
Omaha	3	0	-----	0	22	1	4	0	40	0	0	0
Kansas												
Topeka	0	0	----	0	41	0	3	0	1	0	0	2
Wichita	0	0	- ---	0	119	0	1	0	0	0	0	0
SOUTH ATLANTIC												
Delaware												
Wilmington	0	0		0	3	0	6	0	0	0	0	1
Maryland												
Baltimore	3	0	2	1	888	5	27	0	88	0	0	21
Cumberland	0	0	---	0	0	0	0	0	2	0	0	0
Frederick	0	0	-	0	1	0	0	0	1	0	0	0
District of Columbia												
Washington	1	0	11	2	150	4	14	0	239	0	0	3
Virginia												
Lynchburg	0	0	17	0	6	0	1	0	0	0	0	0
Richmond	0	0	2	0	283	2	6	0	12	0	0	0
Roanoke	0	0		0	68	0	3	0	0	0	0	2
West Virginia:												
Charleston	0	0	--	0	1	1	0	0	10	0	0	0
Wheeling	0	0	--	0	4	0	3	0	12	0	0	0
North Carolina												
Winston-Salem	0	0	-	0	39	0	4	0	2	0	0	0
South Carolina												
Charleston	0	0	5	0	19	2	0	0	2	0	0	1
Georgia												
Atlanta	1	0	10	2	25	1	3	0	6	0	0	0
Brunswick	0	0		0	18	0	3	0	0	0	0	0
Savannah	0	0	4	2	11	1	1	0	1	0	0	0
Florida												
Tampa	0	0	4	0	8	2	1	0	1	0	0	2
EAST SOUTH CENTRAL												
Tennessee												
Memphis	0	0	5	0	14	9	6	0	12	0	0	0
Nashville	0	0	--	1	8	2	6	0	5	0	0	0
Alabama												
Birmingham	0	0	1	1	27	0	5	0	1	0	0	3
Mobile	0	0	--- -	2	17	5	3	0	0	0	0	0
WEST SOUTH CENTRAL												
Arkansas:												
Little Rock	0	0	6	0	24	0	2	0	1	0	0	1
Louisiana												
New Orleans	0	1	9	1	41	1	2	0	8	0	0	2
Shreveport	0	0	----	0	0	0	7	0	1	0	0	0
Texas												
Dallas	2	0	-----	0	113	0	8	0	4	0	0	0
Houston	3	0	-----	0	43	0	6	0	1	0	0	0
San Antonio	5	0	4	1	17	2	5	1	1	0	0	0
MOUNTAIN												
Montana												
Billings	0	0	------	0	11	0	0	0	3	0	0	0
Great Falls	0	0	------	0	17	0	3	0	10	0	0	0
Helena	0	0	------	0	0	0	0	0	3	0	0	0
Missoula	0	0	------	0	6	0	2	0	3	0	0	0
Idaho:												
Boise	0	0	------	0	10	0	0	0	17	0	0	0
Colorado:												
Denver	1	0	6	0	118	1	5	0	20	0	0	19
Pueblo	0	0	------	0	17	0	0	0	3	0	0	2
Utah:												
Salt Lake City	0	0	------	1	6	0	3	0	23	0	0	1

City reports for week ended March 11, 1944—Continued

	Diphtheria cases	Encephalitis, infectious, cases	Influenza Cases	Influenza Deaths	Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
PACIFIC												
Washington												
Seattle	0	0		2	38	0	4	0	42	0	0	7
Spokane	0	0	2	2	54	0	1	0	24	0	0	4
Tacoma	1	0		0	10	0	0	0	70	0	0	2
California												
Los Angeles	4	0	23	2	179	7	11	0	33	0	0	10
Sacramento	0	0		0	11	0	4	0	2	0	0	7
San Francisco	0	0	13	3	88	6	10	2	93	0	0	18
Total	51	3	163	48	8 624	199	497	7	2 461	0	7	315
Corresponding week, 1943	47	3	331	43	5 499	168	530	536	1 525	1	7	1 059
Average, 1939-43	82		538	[1] 54	[2] 4 623		[1] 519		1 566	10	18	1 078

[1] 3-year average, 1941-43

[2] 5-year median

Dysentery, amebic—Cases Boston 2 New York, 1 Philadelphia 3, St Louis 1 Billings, 1, San Francisco, 1

Dysentery, bacillary—Cases New York 1 Nashville, 1, Los Angeles 5 Charleston S C, 11

Dysentery, unspecified—Cases San Antonio 2

Leprosy—Cases Tampa, 1

Typhus fever—Cases Nashville, 1 New Orleans, 1

Rates (annual basis) per 100,000 population, by geographic groups, for the 87 cities in the preceding table (estimated population, 1942, 34,614,400)

	Diphtheria case rates	Encephalitis infectious case rates	Influenza Case rates	Influenza Death rates	Measles case rates	Meningitis meningococcus case rates	Pneumonia death rates	Poliomyelitis case rates	Scarlet fever case rates	Smallpox case rates	Typhoid and paratyphoid fever case rates	Whooping cough case rates
New England	5 0	2 5	0 0	5 0	1 231	34 9	89 7	0 0	660	0 0	5 0	87
Middle Atlantic	5 8	0 4	9 4	4 5	922	28 2	70 7	1 3	278	0 0	1 3	33
East North Central	5 3	0 0	7 6	7 0	1 036	29 3	53 3	0 6	344	0 0	1 2	52
West North Central	11 8	0 0	9 8	2 0	3 733	41 2	92 1	0 0	473	0 0	0 0	24
South Atlantic	8 7	0 0	95 7	12 2	2 652	31 3	125 3	0 0	654	0 0	0 0	52
East South Central	0 0	0 0	35 7	23 8	393	95 3	119 1	0 0	107	0 0	0 0	18
West South Central	30 5	3 1	58 0	6 1	727	9 2	91 6	3 1	49	0 0	0 0	9
Mountain	8 1	0 0	48 4	8 1	1 491	8 1	104 8	0 0	661	0 0	0 0	177
Pacific	8 8	0 0	66 6	15 8	666	22 8	52 6	3 5	403	0 0	0 0	84
Total	7 7	0 5	24 6	7 3	1 303	30 1	75 1	1 2	372	0 0	1 1	48

TERRITORIES AND POSSESSIONS

Hawaii Territory

Honolulu—Dengue fever.—During the period February 16-29, 1944, 18 cases of dengue fever were reported in Honolulu, T. H., bringing the total number reported to date to 1,434. The number of cases reported during this period is approximately half the number of cases reported for the first half of February, but higher than the number of cases reported for the last half of January.

FOREIGN REPORTS

ANGOLA

Notifiable diseases—October–December 1943.—During the months of October, November, and December 1943 certain notifiable diseases were reported in Angola as follows:

Disease	October		November		December	
	Cases	Deaths	Cases	Deaths	Cases	Deaths
Beriberi	7		6		5	
Cerebrospinal meningitis	2	1	1	1	1	
Chickenpox	112		58		55	
Diphtheria			4		1	
Dysentery (amebic)	182	7	229	20	127	8
Dysentery (bacillary)	5		1		3	
Gonorrhea	263		238		408	
Grippe	834	19	690	17	853	21
Hookworm disease	523	7	528	13	374	
Leprosy	16		7		2	
Measles	95	1	100	1	63	
Mumps	4		23		10	
Pneumonia	156	24	165	11	173	17
Poliomyelitis	2		3		2	
Rabies			1	1		
Relapsing fever	16		17		25	
Sleeping sickness	189	14	253	18	154	4
Smallpox	18		4		17	
Syphilis	426		432		458	
Tetanus	7	1	6	1	7	2
Tuberculosis (respiratory)	28	4	51	10	40	4
Typhoid and paratyphoid fever	8	1	18	1	11	1
Whooping cough	233	3	219	5	202	
Yaws	871		735		811	

CANADA

Provinces—Communicable diseases—Week ended February 26, 1944.—During the week ended February 26, 1944, cases of certain communicable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox	1	5	1	191	405	71	47	134	176	1,031
Diphtheria	5	6	1	20	5	6				43
German measles		1		32	47	28	19	7	9	143
Influenza		22			35	1	4		19	81
Measles	1	36	1	845	679	78	51	222	11	1,924
Meningitis, meningococcus		1		1	3	1	1		2	9
Mumps	3	11		53	250	98	19	35	21	490
Scarlet fever		16	1	66	230	71	10	75	64	533
Tuberculosis (all forms)		8	5	142	36	24	2	24	134	375
Typhoid and paratyphoid fever			1	31		1	1			34
Undulant fever				2	2	1			2	7
Whooping cough		16		89	90	12	6	4	29	246

CUBA

Habana—Communicable diseases—4 weeks ended March 4, 1944.—During the 4 weeks ended March 4, 1944, certain communicable diseases were reported in Habana, Cuba, as follows:

Disease	Cases	Deaths	Disease	Cases	Deaths
Diphtheria	35	1	Scarlet fever	1	---
Malaria	6	---	Tuberculosis	6	1
Measles	42	4	Typhoid fever	32	3

SWITZERLAND

Notifiable diseases—July–September 1943.—During the months of July, August, and September 1943, cases of certain notifiable diseases were reported in Switzerland as follows:

Disease	July	August	September	Disease	July	August	September
Cerebrospinal meningitis	10	7	8	Mumps	146	75	95
Chickenpox	283	123	113	Paratyphoid fever	9	7	23
Diphtheria	133	140	331	Poliomyelitis	18	32	21
Dysentery	230	184	340	Scarlet fever	96	188	328
German measles	46	13	6	Tuberculosis	380	335	392
Hepatitis, epidemic	698	925	1 247	Typhoid fever	17	13	20
Influenza	10	4	31	Typhus fever			1
Lethargic encephalitis		1		Undulant fever	11	14	12
Malaria	2	-		Whooping cough	661	711	813
Measles	467	267	247				

WORLD DISTRIBUTION OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER

From medical officers of the Public Health Service, American consuls, International Office of Public Health, Pan American Sanitary Bureau, health section of the League of Nations and other sources The reports contained in the following tables must not be considered as complete or final as regards either the list of countries included or the figures for the particular countries for which reports are given

CHOLERA

[C indicates cases]

NOTE —Since many of the figures in the following tables are from weekly reports, the accumulated totals are for approximate dates

Place		January–December 1943	January 1944	February 1944—week ended— 5	12	19	26
ASIA							
Ceylon	C	50	-	2	---	---	---
China Kwangsi Province	C	[1] 1 100			---	---	---
India	C	323 270	23 274	2 715	---	---	---
Bombay	C	28			---	---	---
Calcutta	C	7 007	206	44	32	54	---
Chittagong	C	391	6	2	---	---	---
Cochin	C	192	---	---	---	---	---
Madras	C	1 219	30	3	---	---	---
Negapatam	C	21	12	3	---	---	---
Vizagapatam	C	68	---	---	---	---	---
India (French)	C	55	---	---		---	---
Chandernagor	C	8	---	---	---	---	---
Karikal	C	30	---	---	---	---	---
Pondichery	C	17	---	---	---	---	---

[1] Cases reported up to Sept 8, 1943, with a mortality rate of over 25 percent

PLAGUE

[C indicates cases; D, deaths; P, present]

Place		January–December 1943	January 1944	February 1944—week ended—			
				5	12	19	26
AFRICA							
Basutoland	C	[1] 23	-	-	-	-	-
Belgian Congo	C	[2] 32	3	-	-	-	-
Plague-infected rats		P	-	-	-	-	-
British East Africa:							
Kenya	C	18	-	-	-	-	-
Uganda	C	20	-	-	-	-	-
Egypt	C	163	84	14	-	-	-
Port Said	C	10	1	-	-	-	-
Suez	C	118	82	12	5	6	3
French West Africa: Dakar	C	32	-	-	-	-	-
Madagascar	C	234	-	-	-	-	-
Morocco (French)	C	299	13	-	-	-	-
Rhodesia, northern	C		1	-	-	-	-
Senegal	C	251		-	-	-	-
Union of South Africa	C	85	10	3	-	-	-
ASIA							
India	C	8,643	1,451	375	-	-	-
Indochina	C	31	-	-	-	-	-
Palestine	C	13	-	-	-	-	-
EUROPE							
Portugal (Azores)	C	[3] 56	-	-	-	-	-
SOUTH AMERICA							
Ecuador: Loja Province	C	15	-	-	-	-	-
Peru:							
Ancash Department	C	2	-	-	-	-	-
Ica Department	C	2	-	-	-	-	-
Lambayeque Department	C	2	-	-	-	-	-
Libertad Department	C	26	-	-	-	-	-
Lima Department	C	23	-	-	-	-	-
Lima	C	1	-	-	-	-	-
Plague-infected rats		P	-	-	-	-	-
Piura Department	C	11	-	-	-	-	-
Venezuela: Aragua and Miranda States	C	10	-	-	-	-	-
OCEANIA							
Hawaii Territory:							
Hamakua District	D	7	[4] 2	-	1	-	-
Plague-infected rats		[5] 93	[6] 8	3	1	[7] 6	-

[1] Includes 12 cases of pneumonic plague in a village south of Mafeteng.
[2] Includes 7 cases of pneumonic plague
[3] Approximated.
[4] Includes 1 death from pneumonic plague.
[5] Includes 4 plague-infected mice.
[6] Includes 3 plague-infected mice.
[7] Includes 1 plague-infected mouse.

SMALLPOX

[C indicates cases; D, deaths; P, present]

Place		January-December 1943	January 1944	February 1944—week ended— 5	12	19	26
AFRICA							
Algeria	C	1,741	93			[1] 111	
Angola	C	652					
Basutoland	C	146					
Belgian Congo	C	4,643	332	54	48		43
British East Africa:							
Kenya	C	3,439	776	153	150		
Mombasa	C	72	18	[2] 12	7		
Tanganyika	C	143	61				
Uganda	C	132	135	50			
Dahomey	C	156	7				
Egypt	C	4,161	592	288	277		
French Equatorial Africa	C	173	60				
French Guinea	C	378	1				
French West Africa Dakar	C	4	1				
Gold Coast	C	25					
Ivory Coast	C	160	39				
Mauritania	C	40					
Morocco (French)	C	1,170	285				
Morocco (Spanish)	C	1	3				
Mozambique	C	1					
Nigeria	C	6,132	474	108	96		
Niger Territory	C	308	232				
Rhodesia, northern	C	123					
Senegal	C	111	2				
Sierra Leone	C	3					
Sudan (French)	C	3,795	445				
Tunisia	C	4	2				
Union of South Africa	C	788	3	1	2	6	
ASIA							
Arabia	C	3	4	[2] 2		1	
Ceylon	C	85	2				
India	C	53,577	25,952	8,212			
India (French)	C	10					
Indochina	C	5,113	344				
Iran	C	631					
Iraq	C	272	27	2	19	27	
Palestine	C	104				1	
Syria and Lebanon	C	1,132	39	10	2		
Trans-Jordan	C	19					
EUROPE							
Belgium	C	1					
France	C	2					
Germany	C	1					
Gibraltar	C	1				P	
Great Britain: London [3]							
Greece	C	852					
Portugal	C	51	4	1	3		
Scotland	C	[4] 2					
Spain	C	222	2				
Switzerland	C	17					
Turkey	C	12,400					
NORTH AMERICA							
British Honduras	C	1					
Canada	C	6					
Guatemala	C	27					
Honduras	C	2					
Mexico	C	336	30	9	14	11	17
SOUTH AMERICA							
Brazil	C	58	1			1	
British Guiana	C	1					
Colombia	C	391	11	7	7		
Ecuador	C	25					
Peru	D	12	14				
Lima	C		14				
Venezuela	C	106	3				

[1] For 3 weeks.
[2] Imported.
[3] During the week ended March 11, 1944, 7 cases of smallpox with 2 deaths, including 1 imported case from the Middle East, were reported in London, Great Britain.
[4] Includes 1 case on a vessel from North Africa.

TYPHUS FEVER

[C indicates cases; D, deaths]

Place		January–December 1943	January 1944	February 1944—week ended—			
				5	12	19	26
AFRICA							
Algeria	C	8,321	80			[1] 81	
Basutoland	C	28					
Belgian Congo	C	39		1	2		1
British East Africa:							
Kenya	C	4	1		2		
Mombasa	C	1					
Uganda	C	1					
Egypt	C	40,084	932	526			
French Equatorial Africa	C	3					
French Guinea	C	1					
French West Africa. Dakar	C	32			1		
Gold Coast	C	9					
Morocco (French)	C	16,191	143				
Morocco (Spanish)	C	401					
Mozambique	C	1	1				
Nigeria	C	11					
Rhodesia, northern	C	14	5				
Senegal	C	2					
Sierra Leone	C	3					
Tunisia	C	356	53			[1] 75	
Union of South Africa	C	4,402	6			1	
ASIA							
Afghanistan	C	520					
Arabia Western Aden Protectorate	C		14	1			
China. Shanghai	C	12					
India	C	1,066					
Iran	C	[2] 12,885	[2] 450				
Iraq	C	1,423	7			1	1
Palestine	C	340	12	18	15	19	27
Syria and Lebanon	C	95	3	6	14		
Trans-Jordan	C	17					
EUROPE							
Bulgaria	C	1,843	80				
France—Seine Department	C	2					
Germany	C	[3] 973					
Greece	C	99					
Hungary	C	1,012	160	107		[4] 121	54
Irish Free State	C	20					
Netherlands	C	3	7				
Portugal	C	11					
Rumania	C	8,441	1,153				[5] 2,256
Slovakia	C	637	100				
Spain	C	640	15				
Switzerland	C	1					
Turkey	C	4,234					
NORTH AMERICA							
Cuba	C	1					
Guatemala	C	1,334	155				
Jamaica	C	33					
Mexico	C	1,034	40				
SOUTH AMERICA							
Brazil	C	1					
Chile	C	245	12		2	4	
Colombia	D	2					
Curacao	C		1				
Ecuador	C	350					
Peru	C	17	1				
Venezuela	C	25	3				
OCEANIA							
Australia	C	123	11	2	4		6
Hawaii Territory	C	69	7	2	1	2	4

[1] For 3 weeks.
[2] Approximated on account of overlapping of dates.
[3] For the period Jan. 1 to Apr. 30, 1943.
[4] For 2 weeks.
[5] For the month of February 1944.

YELLOW FEVER

[C indicates cases; D, deaths]

Place		January–December 1943	January 1944	February 1944—week ended— 5	12	19	26
AFRICA							
Belgian Congo:							
Bondo	D	3					
Kinzao	D	1					
Leopoldville	C	2					
Stanleyville	D	1					
Yanonge	C	1					
British East Africa, Kenya—Kisumu	C	1					
Dahomey:							
Djougou District	C	[1] 2					
Natitingou	C	[1] 1					
French Guinea:							
Baccoro	C	1					
Dubreka	C	2					
Friguiagbe	C	1					
Matakang Island	D	1					
Gold Coast:							
Asuboi	C	1					
Komenda	C	1					
Tamale	C		[1] 1				
Ivory Coast:							
Abidjan	C	3					
Aboisso	C	[1] 1					
Bonoua	C	1					
Soubre	C	1					
Toumodi	D	[1] 1					
Portuguese Guinea	C	3					
Senegal:							
Goudiri	D	1					
Kolda	C	1					
Tambacounda	C	2					
Velingara Casamance	C	1					
Sierra Leone: Galinas	C	[1] 1					
EUROPE							
Portugal: Lisbon.[2]							
SOUTH AMERICA							
Brazil:							
Amazonas State	D	1					
Matto Grosso State	D		3				
Para State	D	1					
Colombia:							
Boyaca Department	D	14					
Cundinamarca Department	D	7					
Intendencia of Meta	D	9					
Santander Department	D	1					

[1] Suspected.
[2] According to information dated January 21, 1944, it is reported that a vessel which called at the islands of Sao Tome and Cape Verde arrived at Lisbon, Portugal, with cases of yellow fever on board.

COURT DECISION ON PUBLIC HEALTH

Anthrosilicosis—recovery of damages denied.—(Pennsylvania Supreme Court; *Prattico* v. *Hudson Coal Co.*, 32 A.2d 733; decided June 30, 1943.) The plaintiff sought to recover damages for the occupational disease of anthrosilicosis. The jury disagreed and was discharged and the defendant company moved for judgment on the whole record. The lower court dismissed this motion and ordered a retrial and the defendant appealed to the Supreme Court of Pennsylvania. The appellate court said that the fundamental question was whether a plaintiff, who admitted that he knew coal mining "must make dust," had made out a case for the jury by showing merely that

he had contracted silicosis after working for 8 years in the "face" of coal mine chambers where the air became so dust laden that "intermittently—at times" visibility to see another person was only 3 feet. The plaintiff's contention was that this question had to be answered in the affirmative, taking the view that "by common law and by statute * * * the defendant had a duty to insure the plaintiff a safe place to work" and that "the plaintiff's admitted physical condition is a conclusive answer that he was not furnished a safe place to work."

The supreme court reviewed the applicable statute, the anthracite mining act, but found that nowhere in the act was there any provision imposing on mine owners an absolute duty to eliminate or sweep away the dust incident to mine operations. There was no mention of dust except in one part relating solely to the removal of dust from coal breakers. Nor, according to the court, could such duty be held to arise by implication from language in the act relative to rendering harmless smoke and noxious gases and requiring the use of every precaution to insure the safety of the workmen. The act did provide for not less than 200 cubic feet of air per minute for each employee and violations of this section by the defendant were alleged but not proved. The defendant's official records, which were unimpeached by the plaintiff, conclusively established that the defendant provided a constant and adequate supply of pure air as provided in the mining act.

Although there was no statutory duty, the supreme court stated that it did not mean to say that no duty whatever rested upon the defendant concerning the elimination or amelioration of dust in its mine. The test of liability was the failure to furnish a safe place to work as measured by the standards imposed by the common law. The common law doctrine had been stated in a prior case from which the court quoted as follows: "The employer is bound to furnish machinery and appliances reasonably safe for the use intended. Reasonable safety within the meaning of the law means that the machinery and appliances furnished must be of the usual and ordinary kind adopted by those in the same kind of business. An employer is not even bound to provide the safest machinery or the newest and most approved appliances. He has performed his duty in this respect when he furnishes those of the ordinary character in general use in the business in which he is engaged." It was pointed out that the test of liability was not danger but negligence and that negligence was never imputed from the employment of methods or machinery in general use in the business. In the instant case the only evidence on the subject was that the methods and equipment of defendant were of the usual and ordinary character in general use throughout the

anthracite mining industry. The court concluded that there was, therefore, no question of breach of defendant's duty to furnish a reasonably safe place to work to submit to the jury, as no such breach had been shown. To make out a prima facie case, said the court, the burden rested with plaintiff to produce evidence which, if believed, would warrant a finding that his injury resulted from a failure of defendant to perform a duty imposed by statute or by the general usages of the mining industry. The plaintiff did not meet this burden and hence the defendant was entitled to judgment on the whole record.

FEDERAL SECURITY AGENCY

UNITED STATES PUBLIC HEALTH SERVICE

THOMAS PARRAN, *Surgeon General*

DIVISION OF PUBLIC HEALTH METHODS

G. ST. J. PERROTT, *Chief of Division*

The PUBLIC HEALTH REPORTS, first published in 1878 under authority of an act of Congress of April 29 of that year, is issued weekly by the United States Public Health Service through the Division of Public Health Methods, pursuant to the following authority of law: United States Code, title 42, sections 7, 30, 93; title 44, section 220.

It contains (1) current information regarding the prevalence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

The PUBLIC HEALTH REPORTS is published primarily for distribution, in accordance with the law, to health officers, members of boards or departments of health, and other persons directly or indirectly engaged in public health work. Articles of special interest are issued as reprints or as supplements, in which forms they are made available for more economical and general distribution.

Requests for and communications regarding the PUBLIC HEALTH REPORTS, reprints, or supplements should be addressed to the Surgeon General, United States Public Health Service, Washington, D. C. Subscribers should remit direct to the Superintendent of Documents, Washington 25, D. C.

Librarians and others should preserve their copies for binding, as the Public Health Service is unable to supply the general demand for bound copies. Indexes will be supplied upon request.

UNITED STATES GOVERNMENT PRINTING OFFICE, WASHINGTON : 1944

For sale by the Superintendent of Documents, Washington 25, D. C.

Price 5 cents. Subscription price $2.50 a year

Public Health Reports

VOLUME 59 APRIL 7, 1944 NUMBER 14

IN THIS ISSUE

CONTENTS

Public Health Reports

Vol. 59 • APRIL 7, 1944 • No. 14

NOMENCLATURE OF PNEUMOCOCCIC TYPES[1,2]

By BERNICE E. EDDY, *Bacteriologist, United States Public Health Service*

The nomenclature of pneumococcic types is confusing because of different methods of classification. Two systems of naming have been used. In one, numbers were used for all types without consideration of antigenic components in common with other types. In the other, antigenic relationships were shown by the use of numbers and by numbers plus letters. In addition, certain types of pneumococci have been identified by names or letters.

Exponents of the first system were Cooper and her coworkers (*1*, *2*) in 1929-32. They identified 29 pneumococcic types in addition to types 1, 2, and 3, and included were the pneumococci which had been classified as IIA and IIB by Avery, IVA, IVB, and IVE by Robinson, and the atypical III by Sugg, Gaspari, Fleming, and Neill (*2*). The second method of naming was used by Kauffmann and his associates (*3*) in Denmark in 1940. They reported 20 types in addition to those described by Cooper, using numbers for types plus letters for subtypes. In 1941 the Bureau of Laboratories of New York City (*4*) abandoned the procedure of labeling all new types with numbers as had been their policy and adopted the terminology advocated by Kauffmann. Walter and her collaborators (*5*) during the same year described 17 types above 32 and designated certain of the types as subtypes. Mørch (*6*) in 1942 also reported new types, identifying some as subtypes, but she changed the nomenclature of some of the types described by Walter. In discussing these new types she stated, "It is to be emphasized once more that all the new types entered here in various groups are independent types, just like Cooper's types."

In the above papers the principal types are not consistently of broader or narrower antigenic components than the subtypes. For instance, type 19 has broader antigenic components than 19A, while 11A reacts with more heterologous types than 11.

Because of the disagreement as to which types should be regarded as subtypes, or rather because of the lack of a satisfactory definition of

[1] From the Division of Biologics Control, National Institute of Health.

[2] In part, this study on the interrelationship of the pneumococcic types was undertaken at the request of the Standard Methods Committee on Biological Products of the American Public Health Association. For the ever-ready help and advice of its members the author desires to express grateful appreciation.

a subtype, and because certain types are related not to one but to two or even more other types, it seems desirable to designate every type by a different number regardless of its close relationship to another type. The following is a list of the types, omitting all but three of the types 1 to 32, and the terminology under which they have previously been known.

Pneumococcic type numbers proposed	Terminology of Walter (*4*), N. Y. C., prior to 1941	Terminology of Walter (*5*), N. Y. C., adopted 1941	Terminology of Kauffmann (*3*) and Mørch (*6*), Denmark	Other terminology for new types
7			7A?	
26			6B	
30	30	15A	15A	
33	33	33	9A	
34	34	10A	10A	
35	35	35	35	
36	36	36	36	
37	37	37	37	
38	38	38	41	
39	39	39	33C	
40	40	40	33A	
41	41	34	34	
42	42	30	33B	
43	43	11A	11A	11-16? (*7*)
44	44	18A	18A	
45	45	24A	40	
46	46	23A	23A	
47	47	35A	35A	
48	48	7B	7B	
49	49	9L	9L	
50			7C	Hinman (*8*)
51			7	Spring Valley (*3*)
52				Odd (*9*).
53			11B?	11-16? (*7*).
54			15B	
55			18B	
56			18C	
57			19A	
58			19B	
59			19C	
60				
61			42?	Weingart (*8*)
62				
63			22A	
64			23B	
65			24A	
66			35B	Hogo (*8*)
67			32A	
68			9V?	
69			39	
70		40A	33	
71		26	38	
72				T (*10*).
73				
74				
75				

It is believed that this system of naming each type with a number will prove advantageous for the further study of type interrelationship. It is easier to recognize new types of pneumococci than it is to determine where they belong according to their antigenic components *in common with other types.* The use of a number for each type does not prevent related types from being grouped together whenever possible or from being changed from one group to another if it is useful to do so.

SUMMARY

Numbers have been proposed to designate every known pneumococcic type without consideration of cross reactions with other types.

REFERENCES

(1) Cooper, G., Edwards, M., and Rosenstein, C.: The separation of types among the pneumococci hitherto called group IV and the development of therapeutic antiserums for these types. J. Exp. Med., **49**: 461–474 (1929).

(2) Cooper, G., Rosenstein, C., Walter, A., and Peizer, L.: The further separation of types among the pneumococci hitherto included in group IV and the development of antisera for these types. J. Exp. Med., **55**: 531–554 (1932).

(3) Kauffmann, F., Mørch, E., and Schmith, K.: On the serology of the pneumococcus group. J. Immunol., **39**: 397–426 (1940).

(4) Sutliff, W. D.: Terminology for new pneumococcus types. Am. Pub. Health Year Book Sup. to A. P. H. A., **31**: 139 (1941).

(5) Walter, A., Guevin, B. H., Beattie, M. W., Cotler, H. Y., and Bucca, H. B.: Extension of the separation of types among the pneumococci: Description of 17 types in addition to types 1 to 32 (Cooper) with recommendations for terminology of all types reported through 1940. J. Immunol., **41**: 279–294 (1941).

(6) Mørch, E.: Further studies on the serology of the pneumococcus group. J. Immunol., **43**: 177–202 (1942).

(7) Finland, M., and Brown, J. W.: A study of strains of pneumococci immunologically closely related to both type XI and type XVI pneumococci J. Immunol., **35**: 141–153 (1938).

(8) Forster, G. F., and Shaughnessy, H. J.: Occurrence of strains of pneumococci which react with more than one type specific antipneumococcus serum Proc. Soc. Exper. Biol. and Med., **44**: 306–309 (1940).

(9) Chinn, A. L., and Eddy, B. E.: Report of a new type of pneumococcus which crosses with types X, XI, XX, XXIX, and XXXI. Pub. Health Rep., **56**: 62–75 (1941).

(10) Ordman, D.: Pneumococcus types in South Africa. A study of their occurrence and distribution in the population and the effect thereon of prophylactic inoculation. Publications South African Inst. Med. Res., **9**: 1–27 (1938).

A STUDY OF CROSS REACTIONS AMONG THE PNEUMOCOCCIC TYPES AND THEIR APPLICATION TO THE IDENTIFICATION OF TYPES[1]

By BERNICE E. EDDY, *Bacteriologist, United States Public Health Service*

A knowledge of the interrelationship of the pneumococcic types is important for the identification or tentative identification of types of pneumococci, for the preparation of type specific diagnostic antiserums, and for determining which types of antiserums may be combined advantageously or used for other types.

Data will be presented to show that every strain of a given type of pneumococcus reacts in essentially the same way with both homologous and heterologous type antiserums. There is also considerable regularity in the cross reactions displayed by antiserums of the same type.

[1] From the Division of Biologics Control, National Institute of Health.

MATERIALS AND METHOD

The serums studied were samples of antipneumococcic rabbit serums prepared for therapeutic or diagnostic use by manufacturers and routinely submitted for release, and, in addition, antiserums for 17 types which have not been produced commercially. These include 10 unabsorbed antiserums sent by the New York City Laboratories, 3 diagnostic antiserums supplied by the Lederle Laboratories, 1 prepared at the National Institute of Health, and 4 submitted for consideration for license. The therapeutic antiserums were concentrated and unabsorbed. The diagnostic antiserums had all been routinely tested for cross reactions with heterologous types of pneumococci 1 to 32, inclusive (omitting types 26 and 30), and some also with types 33 and 34. Any cross reactions which were found were removed before the serum was submitted for release.

Cultures of types 1 to 34, inclusive, were obtained from different commercial laboratories and from clinical material or as cultures sent to the National Institute of Health for identification. For many of the new types of pneumococci, the author is indebted to Annabel Walter, of the Bureau of Laboratories of New York City. The latter types include the 17 new types described by Walter and her coworkers (*1*, *2*), all but 4 of the types reported by the Danish workers (*3*, *4*, *5*), 2 types isolated by Ordman (*6*), and 5 previously unidentified types. Three types were obtained through the courtesy of Dr. G. F. Forster, of the Illinois Department of Health, and 6 types from Frances Clapp, of the Lederle Laboratories, Inc. Dr. J. E. Noble and Emily Godfrey, of the Department of Health of the District of Columbia, supplied specimens of sputum from pneumonia patients from which were isolated 7 strains of pneumococci belonging to types above 34. New types of pneumococci obtained from clinical material or as cultures sent to the National Institute of Health for identification were:

Type 26 from the spinal fluid of an infant ill with meningitis, January 1939.
Type 54 from a nonfatal case of meningitis in a 16-year-old girl, May 1940.
Type 52 described by Chinn and Eddy (*7*) in 1941.
Type 55 from a fatal case of meningitis in an infant, January 1941.
Type 43 from an infant ill with meningitis, February 1941.
Type 64 from the sputum of a mild case of pneumonia in an adult, May 1941.
Type 42 from a fatal case of meningitis in an adult, October 1942. Meningitis developed a few days after the patient's skull had been fractured.
Type 61 from the throat of an adult with chronic sinusitis, June 1943.

Other strains of pneumococci were received from different commercial laboratories for the purpose of checking certain lots of antipneumococcic serums.

The terminology for the different types is given in the preceding article. In all the tables, subtypes or other names of strains previously described in the literature are given in parentheses.

For determining the extent or degree of cross reactions the test (*8*) used at the National Institute of Health for determining the potency of diagnostic antiserums was employed. It has been shown that if the antigens are carefully prepared and standardized, the results of the tests may be duplicated with regularity. A uniform method of recording the amount of capsular swelling was employed throughout. A reaction was considered positive when at least 90 percent of the pneumococci in a preparation exhibited swollen capsules with definite outlines comparable to those produced by a control serum. The titers shown in all the tables represent the highest dilution of antiserum that gave a positive reaction. If some, but less than 90 percent, of the organisms showed swollen capsules with well-defined outlines with a serum dilution, a plus was added to the next lower dilution which gave a positive reaction; with undiluted antiserum the reaction was indicated by the letter "P." The letter "T" denoted that undiluted antiserum swelled the capsules so slightly that definite outlines could not be discerned and "0" indicated that no capsular swelling occurred.

IDENTIFICATION OF PNEUMOCOCCIC TYPES

Antipneumococcic serum for an homologous strain not only gave similar capsular swelling titers for other strains of the same type but the different strains were reacted upon by the same heterologous type antiserums. The degree of the cross reactions was also essentially the same. For example, in table 1 it may be noted that the three strains of type 2 pneumococci appear to be antigenically identical. Type 2 anti-

TABLE 1.—*Data illustrating the similarity of the reactions of homologous and heterologous type antiserums with different strains of pneumococci of the same type as compared with a related type*

Antiserums			Capsular swelling titers for—				
Use	Type	Lot	Homologous types	Type 2—Strain			Type 45 (24A) (40)—Strain
				S	R	N	Colemore
Therapeutic	1	101	1:128+	T	T	T	0
Do	2	201	1:256	1:256	1:256	1:256	1:4
Diagnostic	2	212	1:32+	1:32+	1:32+	1:32+	P
Therapeutic	5	503	1:64+	P	P	P	0
Do	6	604	1:64+	T	T	T	0
Do	7	701	1:128+	0	0	--------	T
Do	10	1001	1:128	P	P	P	0
Do	11	1104	1:128	1:4+	1:4+	1:4+	0
Do	12	1201	1:128	T	P	T	0
Do	14	1406	1:128	T	T	T	0
Do	20	2003	1:128	<1:4	<1:4	<1:4	1:8+
Diagnostic	20	2009	1:32+	--------	0	--------	1:4+
Therapeutic	24	2401	1:128	0	0	0	1:16
Diagnostic	24	2408	1:16+	0	--------	--------	1:4+
Therapeutic	32	3202	1:128+	T	P	P	0
Experimental	59	(1)	1:16+	0	--------	--------	T

[1] Unabsorbed antiserum prepared at the New York City Laboratories.
The figures state the capsular swelling titers of the antiserums. "P" indicates that undiluted serum caused capsular swelling but that less than 90 percent of the organisms had capsules with distinct outlines, "T" that there was perceptible swelling but that none of the pneumococci had capsules with distinct outlines, and "0" that no capsular swelling occurred.

serums gave cross reactions with type 45, but the type 2 pneumococci differed from this type by showing capsular swelling with certain heterologous type antiserums which did not cross with type 45, or by being reacted upon to a different degree.

Likewise, the similarities and differences of pneumococci of type 7 and three types which cross with 7 are shown in table 2. Types 7 and 51 are examples of types which are so much alike that it would be impractical to produce antiserums for each of them. Kauffmann (*4*) by means of cross absorption experiments demonstrated the existence of two closely related types which he named 7 and 7A. The present type 51 is the same as the Danish type 7 and it is probable that the type 7 in this study corresponds to the Danish 7A. It may be noted that antipneumococcic serums for types 18 and 21 displayed cross reactions for type 7 but not for 51. The cross between types 7 and 18 was first noted by Cooper and her collaborators (*11*) who stated that they had tested many strains of 7 and 18 for their cross agglutination reactions and found them to differ considerably.

The regularity with which different strains of pneumococci of the same type exhibited capsular swelling with highly potent antiserums for heterologous types has made possible a useful and time-saving method of identification of pneumococci of some of the more recently identified types. Thus a pneumococcus which manifests capsular swelling with an unabsorbed type 7 antiserum might be any of four types. The type could be determined by testing with potent heterologous type antiserums, particularly those listed in table 2. For example, capsular swelling titers of 1:8+ with the antiserums, type 7, lot 701, and type 24, lot 2401, and 1:4+ with the type 20 antiserum lot 2001, and no reaction with other antiserums of types 1 to 34, inclusive, would indicate that the pneumococcus was a type 50. Every new type of pneumococcus, with the exception of one which was not reacted upon by any of the antiserums employed in this study, showed capsular swelling with antiserums of different heterologous types or the extent or degree of the cross reactions was different. This disproves, at least for some of the types, the view advanced by Kauffmann (*4*) and Mørch (*5*) that exact type diagnosis can be made only by cross absorption.

CROSS REACTIONS

One potent concentrated commercial therapeutic antiserum was selected for each of the types and tested for potency with the same strain with which the antiserum was prepared, with other strains of the same type, and for cross reactions with all available remaining types. When capsular swelling was observed, a quantitative Neufeld test was performed to determine the extent of the cross. Samples of antiserums of the same type but prepared in other laboratories

TABLE 2.—*Data illustrating the use of heterologous types of antiserum for comparing or identifying strains of pneumococci*

Antiserums			Capsular swelling titers for—												
Use	Type	Lot	Homologous types	Type 7 (7A?)—Strain M	Type 51 (7)—Strain								Type 48 (7B)—Strain, Johnson	Type 50 (7C)—Strain	
					S	E	492	537	G	L	451	456		Copenhagen	Hinman
Therapeutic	2	201	1:256	P	P	P	<1:4	<1:4	P	<1:4	P	—	0	0	0
Do	5	503	1:64+	P	P	T	<1:4	<1:4	<1:4	P	P	—	0	0	0
Do	7	701	1:128+	1:128+	1:128+	1:128+	1:128+	1:128+	—	—	1:128+	1:128+	1:16	1:8+	1:8+
Diagnostic	7	716	1:32+	1:32+	1:32+	—	1:32+	1:32+	1:32+	1:32+	1:32+	—	1:4+	1:4+	—
Therapeutic	8	804	1:64+	<1:4	<1:4	—	<1:4	—	—	<1:4	<1:4	<1:4	T	0	0
Do	15	1502	1:128	<1:4	P	—	P		P	P	P	—	0	0	—
Do	18	1801	1:128	<1:4	T	T	T	T	T	T	—	—	0	0	0
Diagnostic	18	1811	1:32+	P	0	—	—	—	—	—	—	—	—	—	—
Do	18	1812	1:16+	P	—	—	—	—	—	—	0	—	—	—	—
Therapeutic	20	2001	1:128	0	0	0	—	—	—	—	—	—	0	1:4+	—
Do	20	2003	1:128	0	0	—	0	0	0	0	0	—	T	1:4+	1:4+
Do	21	2101	1:128	P	0	0	0	0	0	0	0	0	0	0	0
Do	24	2401	1:128	T	0	0	0	0	0	0	0	0	1.4+	1:8+	1:8+
Diagnostic	24	2404	1:16+	—	—	—	—	—	—	—	—		1:4	1:4+	1:4+
Therapeutic	28	2801	1:128	T	0	0	—	—	—	—	—	—	0	0	0
Do	29	2902	1:128+	0	T	—	—	—	—	—	—	—	T	0	—
Experimental	59	(1)	1:16+	0	—	0	—	—	—	—	—	—	<1:4	<1:4	—
Do	66	(1)	1:32+	0	0	0	—	—	—	—	—	—	T	0	—

[1] Unabsorbed antiserum prepared at the New York City Laboratories

were also examined. Because of the small volumes of the antiserums for types which have not been on the market, tests for cross reactions were not carried out with all types of pneumococci.

In tables 3 and 4 are given examples of the tests which were carried out on commercial antiserums for each type. The potent concentrated antiserums, type 2, lot 201, and type 10, lot 1001, were each tested for potency with the homologous type strains and for cross reactions with 74 heterologous types of pneumococci. Pneumococci which displayed capsular swelling with one of these antiserums were used to test other antiserums of the same type.

TABLE 3.—*A comparison of the specificity of type 2 antiserums produced in different laboratories as indicated by cross reactions with pneumococci of other types*

Antiserums			Capsular swelling titers for types—							
Use	Producing laboratory	Lot	2	1	5	7 (7A?)	20	38	45 (24A) (40)	51 (7)
Therapeutic	B	201	1:256	P	0	P	P	T	1:4	P
Do	B	202	1:256	P	0	0	------	T	1:4	T
Do	G	208	1:128+	0	0	0	<1:4	0	1:4	T
Do	E	206	1:128+	T	T	0	<1:4	T	1:4	0
Do	C	204	1:64+	T	0	------	<1:4	T	------	0
Do	F	207	1:64+	0	0	0	<1:4	0	------	0
Do	D	205	1:64+	0	0	0	0	T	------	0
Do	A	203	1:32	0	P	0	T	0	------	0
Diagnostic	B	209	1:16+	------	------	------	0	0	T	------
Do	G	210	1:32+	0	------	------	0	0	<1:4	------
Do	E	212	1:32+	0	------	------	0	0	P	------
Do	C	213	1:8	------	------	------	0	0	0	------
Do	F	214	1:8+	0	------	------	0	0	T	------
Do	H	215	1:32+	0	------	------	0	0	T	------
Do	I	216	1:16	0	------	------	0	0	0	------

It may be observed that the therapeutic antiserums for type 2 regularly produced cross reactions with pneumococci of types 20 and 45 and that more than one antiserum caused capsular swelling of certain other types. In general, the most potent antiserums manifested the strongest cross reactions, although other factors seemed to be involved. The length of time during which rabbits are immunized (*2*) and differences in individual rabbits (*5*) have been mentioned as influencing factors.

All of the type 10 therapeutic antiserums yielded cross reactions with pneumococci of types 20, 34, 35, 47, 52, 61, 62, and 66, and one or two reacted with types 2, 13, 17, 29, 30, 36, 42, and 69. In order to prepare specific diagnostic antiserum for type 10 it is possible that absorption would not have to be carried out with pneumococci of each of the above types although further investigation will be necessary to determine which types, if any, could be omitted. Types which manifested many serologic reactions in common were types 20, 47, 61, 62; types 29 and 66; and types 34 and 69.

TABLE 4.—*A comparison of the specificity of type 10 antiserums prepared in different laboratories as indicated by cross reactions with pneumococci of other types*

Antiserums			Capsular swelling titers for types—																
Use	Producing laboratory	Lot	10	2	13	17	20	29	30 (15A)	34	35	36	42 (39) (33B)	47 (35A)	52 (Odd)	61 (42?) (Weingart)	62	66 (35B) (Hoge)	69 (39)
Therapeutic	J	1001	1:128	P	<1:4	T	1:4+	<1:4	0	1:16+	1:4+	T	T	1:4	1:4+	1:4+	1:4+	1:4+	P
Do	A	1002	1:32−	0	0	0	<1:4	T	T	1:8+	<1:4	0	0	<1:4	1:4	<1:4	------	<1:4	T
Do	B	1003	1:32	0	0	0	P	0	0	1:4+	P	0	0	P	P	P	P	P	0
Diagnostic	I	1004	1:16+	------	0	------	0	0	------	0	<1:4	------	0	<1:4	<1:4	<1:4	------	<1:4	0
Do	E	1007	1:16	------	0	------	0		------	0	T	------	0	0	T	T	------	T	0
Do	F	[1] 1008	1:32	------	0	------	0	T	------	1:4	------	------	------	------	<1:4	<1:4	<1:4	<1:4	T
Do	A	1009	1:8+	------	------	------	0	------	------	0	P	------	0	T	P	P	------	P	0
Do	A	[1] 1010	1:16	------	0	------	T	------	------	<1:4	T	------	------	0	T	------	------	------	0
Do	B	[1] 1011	1:8+	------	0	------	T	------	------	<1:4	T	------	0	0	T	P	------	P	0
Do	D	[1] 1012	1:32	------	0	------	0	------	------	1:4	T	------	0	T	T	P	------	P	T
Do	C	[1] 1013	1:16	------	0	------	0	------	------	1:4+	0	------	0	0	0	0	0	0	0

[1] Not tested for a cross reaction with type 34 before being submitted for release

Table 5 represents a tabulation of the capsular swelling reactions obtained when concentrated therapeutic antiserums for each of the types available commercially were titrated with pneumococci of 75 types. Similar titrations of unconcentrated antiserums of types not commercially used were also carried out. The data presented are in general agreement with results obtained through the use of many similar antiserums. A few additional weak cross reactions were shown by other antiserums and these are listed in the last column of the table. As in the case of the antiserums for types 2 and 10 shown in tables 3 and 4, many of the stronger cross reactions occurred regularly in all or almost all of the antiserums of the same type. Others were found in only one or two.

It may be observed that many types of pneumococci appear to have antigenic components in common. Some types were so distantly related that only slight cross reactions were given by highly potent concentrated antiserums. Other types were so much alike that the distinguishing differences were in their reactions or lack of reactions with selected antiserums of heterologous types. Between the two extremes were types showing all gradations of cross reactions.

The types which evinced weak cross reactions and those that manifested very strong cross reactions present few difficulties. An antiserum which shows a weak cross reaction may be easily made specific by absorption. Antiserum for one of two closely related types may be used for both types.

The importance of distinguishing between similar types lies not always in producing antiserum for the types but in preparing specific diagnostic antiserums for other types. Thus type 33 could be differentiated from type 68 with certainty only by means of the capsular swelling caused by a potent concentrated antiserum for type 15. A type 15 diagnostic antiserum, therefore, might not be specific if it were tested for a cross reaction with the type 68 pneumococcus rather than with the closely related type 33 organism. The capsular swelling titers of type 33 antiserums were almost as high for type 68 as for the homologous type 33 Also, absorption of one type 1 diagnostic antiserum, which had produced swollen capsules of pneumococci, types 33 and 68, with type 33 pneumococci removed the cross for both types. An antiserum for type 68 was not tested nor was it determined if absorption of a type 1 antiserum with 68 would remove the cross reactions for type 33 as well as 68.

The extent or degree of cross reactions between related types may be unequal. It may be noted that antiserum for type 6 yielded almost equally high titers for types 6 and 26. Antiserum for type 26,

however, was not uniformly effective for both types. Likewise, antiserums for type 19 showed high titers for both types 19 and 57, but antiserum for type 57 exhibited a considerably lower titer for type 19 than for the homologous type.

Other types which displayed similarities in their serologic reactions and for which it appears that antiserum for more than one of the types is unnecessary are types 7 and 51; 9 and 49; 11 and 43; 15 and 54; 18 and 56; 20, 40, 47, 61, and 62; 22 and 63, 24 and 65; 29 and 66; and 32 and 67. Types 7 and 51 were much alike as was shown in table 2. Pneumococci of type 49 were reacted upon by type 33 antiserums in higher dilutions than were type 9 pneumococci. And diagnostic type 33 antiserums could be freed from cross reactions for both types 9 and 49 by absorption with pneumococci of type 49 but not with type 9. The cross reactions of certain heterologous type antiserums for pneumococci of types 43 and 54 were stronger than for the closely related types 11 and 15, respectively.

For testing diagnostic antiserums for cross reactions, pneumococci of type 43 would appear to be preferable to type 11, and type 54 to type 15. For carrying out mouse protective tests of treatment antiserums of either type 11 or 15, pneumococci of the homologous type proved more suitable. The strains of type 43 tested were less virulent for mice than type 11 and the type 54 pneumococci were less virulent than the type 15. Types 18 and 56, and also types 32 and 67, were so much alike that it would be difficult to identify the types with certainty by means of the antiserums employed in this study. Type 56 showed slight capsular swelling with antiserums of types 64 and 72. Had more potent antiserums for these types been examined, possibly more striking differences would have been observed. Pneumococci of types 20, 40, 47, 61, and 62 and also types 29 and 66 appear to possess complex antigenic components. Type 63 but not type 22 pneumococci showed swollen capsules with type 17 antiserums. However, certain other heterologous type antiserums produced slightly stronger cross reactions with type 22 than 63. To insure the specificity of type 17 antiserums, tests for cross reactions would have to be carried out with type 63. Whether type 63 could be substituted for type 22 as a test organism must await further experimentation. On the basis of the antiserums used in this study it was not clear whether type 24 or type 65 had the broadest antigenic components. According to Mørch (*5*) type 24 but not type 65 (the type 24A of Denmark) crossed with types 45, 48, 50, 58, and 59. This would suggest that type 24 is the better of the two types for a test organism.

Table 5—*Capsular swelling reactions produced by antiserums of different types titrated with 75 types of pneumococci*

Type	Test antiserums	Types of pneumococci: 1	2	3	4	5	6	7 (7A?)	8	9	10	11	12	13	14	15	16	17	18	19	20
1	Therapeutic (concentrated)	1 128+	T	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	do	P	1 256	0	0	0	0	P	0	0	0	0	0	0	0	0	0	0	0	0	P
3	do	0	0	1 64	0	0	0	0	<1 4	0	0	0	0	0	0	0	0	0	0	0	0
4	do	0	0	0	1 128+	0	0	0	0	0	0	0	0	0	1 8	0	0	0	0	0	0
5	do	T	T	0	0	1 128	0	T	0	P	0	0	T	0	0	0	0	0	0	0	0
6	do	0	0	0	0	0	1 128+	T	0	0	0	T	0	0	0	0	0	0	0	T	0
7	do	T	0	0	0	0	0	1 128+	0	0	0	0	0	0	0	0	0	0	0	T	0
8	do	0	0	1 4	0	0	0	0	1 128	0	0	0	0	0	0	0	0	0	0	P	0
9	do	0	0	0	0	0	0	0	0	1 128+	0	0	0	0	0	0	0	0	0	0	0
10	do	0	T	0	0	0	0	0	0	0	1 128	0	0	<1 4	0	0	0	T	0	0	1 4+
11	do	P	T	0	0	0	0	0	0	P	0	1 128	0	0	0	T	T	0	0	0	0
12	do	0	T	0	0	T	0	0	T	0	0	0	1 128	0	0	0	0	0	0	0	0
13	do	0	0	0	0	0	0	0	0	0	<1 4	0	0	1 [illegible]	0	0	0	T	P	<1 4	<1 4
14	do	0	0	0	0	0	0	0	0	0	0	0	0	0	1 128+	T	0	P	0	0	0
15	do	0	0	0	0	0	0	0	0	0	0	1 4	0	0	T	1 128	0	0	0	0	T
16	do	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1 128+	0	P	0	0
17	do	0	0	0	0	0	0	0	0	0	0	0	0	T	T	T	0	1 128	0	T	0
18	do	0	0	0	0	0	0	<1 4	0	0	0	0	0	0	0	0	P	0	1 128	0	0
19	do	0	0	1	0	0	0	0	1 4	T	0	0	0	<1 4	0	0	0	0	0	1 128+	0
20	do	0	<1 4	0	0	0	0	0	0	0	1 4	0	0	P	0	T	0	0	0	0	1 128
21	do	0	0	0	0	0	0	P	T	0	0	0	0	0	P	0	0	0	0	0	0
22	do	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
23	do	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	<1 4	0	0
24	do	T	0	0	0	0	0	T	0	0	0	0	0	0	0	0	0	0	0	0	0
25	do	0	P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
26	Diagnostic[1]					-	1 4				-	-		-			-	0		0	-
27	Therapeutic (concentrated)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28	do	0	0	0	0	0	0	T	0	0	0	0	0	0	0	0	1 8+	0	T	0	0
29	do	0	0	0	0	0	0	0	0	0	T	0	0	P	0	P	0	0	0	0	0
31	do	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1 32+
32	do	0	T	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
33	do	0	0	0	0	0	0	0	0	1 4	0	0	0	0	0	T	0	0	0	T	0
34	do	0	0	0	0	0	0	0	0	0	1 16	0	0	0	0	0	0	0	0	0	0

Type	Test antiserum	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
41	Experimental [2]		0							0	0			0							0
42	Diagnostic		0		0			0	0	0	0		0		0	0		0	0		0
43	Experimental [2]	0					0	0		0		1:16+				0	<1:4		0		
44	do [1]							0	0				0	0		0	0		0	0	
44	do [3]		0		0			0	0	T	0	0	0	0	0	T	T		1:4+	0	0
52	do					0	0	0			T	0		0		0	0		0	0	0
53	Diagnostic [4]	0					0	0		0		1:4+				0	0		0		
57	do [5]			0			0	0	0					0				0	0	<1:4	
59	Experimental [3]		0	0	0		0	0	0	0	0			0	0			0	0	<1:4	
62	do [3]		0		0	0		0	0	0	T	0		0	0	0	0				<1:4
64	do [3]		0		0			0	0	0	0		0		0	0	0		0		
66	do [3]		0		0	0		0	0	0	T	0	0	0	0	0			0		0
70	do [3]		0		0			0	0	0	P		0	0	0	0	0	0	0	0	0
72	do [3]		0		0			0	0	0	0	0	0		0		P		0		0
73	do [3]		0		0			0	0	0	0		T		0		0		0		
74	do [3]		0	0	0	0		0	0	0	0		0	P	0		0		0		
75	do [3]		0		0			0	0	0	0		0		0				0		

Type	Test antiserum	Types of pneumococci: 21	22	23	24	25	26	27	28	29	30 (15A)	31	32	33 (9A)	34 (10A)	35	36	37	38 (41)	39 (33C)	40 (33A)
1	Therapeutic (concentrated)	0	0	0	0	0	0	0	0	0	0	0	0	T	0	0	0	0	0	0	0
2	do	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	T	0	0
3	do	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	do	0	0	0	0	0	0	0	0	0	T	0	0	0	0	0	0	0	0	0	0
5	do	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	T	0	0
6	do	0	0	0	0	0	1:128	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7	do	0	0	0	0	0	0	T	T	0	T	0	0	0	0	0	0	0	0	0	0
8	do	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9	do	0	0	0	0	0	0	T	0	0	0	0	0	0	0	0	T	0	T	0	0
10	do	0	0	0	0	0	0	0	0	<1:4	0	0	0	1:8+	1:16+	1:4+	T	0	0	0	0
11	do	0	0	0	0	0	0	0	T	0	0	0	0	0	0	0	0	0	0	0	0
12	do	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	T	0	T	0	0
13	do	0	0	0	0	0	0	0	0	T	0	0	0	0	0	0	0	0	T	0	0
14	do	0	T	0	0	0	0	0	0	0	P	0	0	0	0	0	0	0	0	0	0
15	do	0	0	0	0	0	0	T	0	0	1:32+	0	0	P	0	0	0	0	T	0	0
16	do	0	0	0	0	0	0	0	1:4	0	T	0	0	0	0	0	0	0	0	0	0
17	do	0	0	0	0	0	0	0	0	0	T	0	T	0	0	0	0	0	0	0	0
18	do	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
19	do	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20	do	0	0	0	0	0	0	0	0	0	T	1:32	0	0	0	<1:4	T	0	0	0	1:64+

See footnotes at end of table.

TABLE 5.—*Capsular swelling reactions produced by antiserums of different types titrated with 75 types of pneumococci*—Continued

Type	Test antiserums	21	22	23	24	25	26	27	28	29	30 (15A)	31	32	33 (9A)	34 (10A)	35	36	37	38 (41)	39 (33C)	40 (33A)
21	Therapeutic (concentrated)	1:128	0	0	0	0	0	0	0	T	T	0	0	0	<1:4	T	0	0	T	<1:4	0
22	do	P	1.128	0	0	0	0	0	0	0	0	1:8	0	0	0	0	<1:4	0	<1:4	0	0
23	do	0	0	1:128	0	0	0	0	T	0	T	0	<1:4	0	0	0	0	0	T	0	0
24	do	P	P	0	1:128	0	0	0	T	0	0	0	0	0	0	0	0	0	0	0	0
25	do	T	0	0	0	1:128	0	0	T	0	0	0	0	0	P	0	0	0	0	0	0
26	Diagnostic[1]	--	--	--	--	--	1:16	--	--	--	--	--	--	--	--	--	0	--	--	0	--
27	Therapeutic (concentrated)	0	0	0	0	0	0	1:128	0	0	P	0	P	0	0	0	0	0	0	0	0
28	do	0	0	0	0	0	0	0	1:128	0	T	0	0	0	0	0	0	0	0	0	0
29	do	0	1:4	0	0	0	0	0	0	1:128	T	0	0	0	T	1:4	<1:4	0	0	0	0
31	do	0	T	0	0	0	0	0	0	0	0	1:128	0	0	0	0	0	0	0	0	1:32+
32	do	0	0	P	0	0	0	0	0	0	0	T	1:128	0	0	0	0	0	T	0	T
33	do	0	0	P	0	0	0	0	0	0	0	0	0	1:128+	0	0	0	0	T	0	0
34	do	T	0	0	0	0	0	0	0	T	T	0	0	0	1:64	P	0	0	0	0	0
41	Experimental[2]	0	--	--	--	--	--		--	0	--	0	--	0	T	<1:4	0	--	0	0	0
42	Diagnostic	0	--	--	--	--	--	0	--	0	--	0	--	0	0	0	0	0	0	<1:4	1:4
43	Experimental[3]	--	0	0	--	--	0	--	0		0	--	--	0	0	0	--	0	0	0	--
44	do[2]	--	--	0	--	--	--	--	0	0	0	0	--	0	--	0					--
44	do[3]	0	--	0	0	--	--	--	0	0	0	0	0	0	0	0	0	0	0	0	0
52	do	T	0	--	--	--	0	0	--	0	T	0	--	0	0	1:8+	0	--	P	0	T
53	Diagnostic[4]	--	--	--	--	--	0	--	0	--	0	--	--	T	0	0	--	--	--	--	--
57	do[5]	--	--	--	--	--	0	--	--	--	--	--	--	0	--	--	0	--	--	--	--
59	Experimental[3]	0	--	--	T	--	--	--	0	--	--	0	--	0	0	0	0	0	0	0	0
62	do[3]	0	0	0	0	--	--	--	0	0	T	<1:4	--	0	0	1:4+	0	0	0	0	<1:4
64	do[3]	0	--	0	--	--	--	0	<1:4	P	0	0	0	0	0	0	0	0	0	T	0
66	do[3]	0	--	0	0	--	--	--	0	1:16	0	0	--	0	0	1:8+	0	0	0	0	T
70	do[3]	0	--	0	0	--	--	--	0	0	0	0	--	0	P	0	0	0	0	<1:4	1:8
72	do[3]	0	--	0	--	--	--	--	0	--	--	0	--	0	0	0	0	0	0	0	0
73	do[3]	0	--	0	--	--	--	--	T	--	--	0	--	0	0	0	0	0	0	0	T
74	do[3]	0	--	0	--	--	--	0	0	0	--	0	T	0	0	0	T	0	1:8	0	0
75	do[3]	0	--	--	--	--	--	--	0	--	--	0	--	0	0	0	0	0	0	0	0

[1] Routinely submitted for release as type 6.
[2] Diagnostic antiserum prepared at Lederle Laboratories, Inc.
[3] Unabsorbed antiserum prepared at the New York City Laboratories.
[4] Routinely submitted for release as type 11.
[5] Routinely submitted for release as type 19

Type	Test antiserums	Types of pneumococci																			
		41 (34)	42 (30) (33B)	43 (11A)	44 (18A)	45 (24A) (40)	46 (23A)	47 (35A)	48 (7B)	49 (9L)	50 (7C) (Hinman)	51 (7)	52 (Odd)	53 (11B?)	54 (15B)	55 (18B)	56 (18C)	57 (19A)	58 (19B)	59 (19C)	60
1.	Therapeutic (concentrated)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2.	do	0	0	0	0	1:4	0	0	0	0	0	P	0	0	0	0	0	0	0	0	0
3.	do	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	T	0	0	0	0
4.	do	0	0	0	0	0	0	0	0	0	0	0	0	0	T	0	0	0	0	0	0
5.	do	0	0	0	0	0	0	0	0	0	0	T	0	0	0	0	0	0	0	0	0
6.	do	0	0	0	0	0	0	T	0	0	0	T	T	0	0	0	T	T	T	T	0
7.	do	0	0	0	0	T	0	0	1:16	0	1:8+	1:128+	0	0	T	0	0	T	T	T	0
8.	do	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9.	do	0	0	0	P	0	0	0	0	1:128	0	0	0	0	0	0	0	0	0	0	0
10.	do	0	T	0	0	0	0	1:4	0	0	0	0	1:4+	0	0	0	0	0	0	0	0
11.	do	0	0	1:128	0	0	0	0	0	0	0	0	P	1:4+	0	0	0	0	0	0	0
12.	do	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13.	do	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	P	<1:4	0	0	0
14.	do	0	0	0	0	0	0	0	0	0	0	0	0	0	1:4	0	0	0	0	0	0
15.	do	0	0	1:8	T	0	1:4+	T	0	0	0	0	T	0	1:128	0	0	0	0	0	0
16.	do	0	0	1:4+	P	0	0	0	0	0	0	0	0	<1:4	0	P	P	0	0	0	0
17.	do	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	T	T	T	1:8+
18.	do	0	0	<1:4	1:16	0	0	0	0	0	0	T	T	P	0	1:16	1:128	0	0	0	0
19.	do	0	0	0	T	0	0	0	0	T	0	0	0	0	0	T	T	1:64+	1:8+	1:8+	0
20.	do	0	0	0	0	1:8	T	1:64	0	0	1·4+	0	<1:4	0	<1:4	0	0	0	0	0	0
21.	do	0	0	0	0	0	0	0	0	0	0	0	0	0	T	0	0	0	0	0	0
22.	do	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
23.	do	0	0	0	<1:4	0	1:16+	T	0	0	0	0	0	0	P	<1:4	<1:4	0	0	0	0
24.	do	0	0	0	0	1:16	0	0	1:4+	0	1:8+	T	0	0	0	0	0	0	<1:4	1:4+	1:8+
25.	do	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
26.	Diagnostic [1]	------	------	0	------	0	------	------	------	------	------	------	0	0	------	------	------	0	0	0	------
27.	Therapeutic (concentrated)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28.	do	0	0	0	0	0	T	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29.	do	0	T	0	0	0	0	1:8	T	0	0	T	1:4	0	T	0	0	0	0	0	0

See footnotes at end of table.

TABLE 5.—*Capsular swelling reactions produced by antiserums of different types titrated with 75 types of pneumococci*—Continued

Type	Test antiserums	Types of pneumococci																			
		41 (34)	42 (30) (33B)	43 (11A)	44 (18A)	45 (24A) (40)	46 (23A)	47 (35A)	48 (7B)	49 (9L)	50 (7C) (Hinman)	51 (7)	52 (Odd)	53 (11B?)	54 (15B)	55 (18B)	56 (18C)	57 (19A)	58 (19B)	59 (19C)	60
31	Therapeutic (concentrated)	0	0	0	0	0	0	1:32+	0	0	0	0	<1:4	0	0	0	0	0	0	0	0
32	do	0	0	0	0	0	T	0	0	0	0	0	0	0	0	0	0	0	0	0	0
33	do	P	0	T	T	0	0	0	0	1:8+	0	0	0	P	0	0	0	T	T	T	0
34	do	T	0	0	0	0	0	0	0	0	0	0	T	0	0	0	0	0	0	0	0
41	Experimental [2]	1:8+						0		0			<1:4								
42	Diagnostic	0	1:32	0	0			0	0	0	0	0	0	0		0	0	0	0	0	0
43	Experimental [2]	0	0	1:32+	0		0	0	0	0	0	0	T	1·4+	0	0					
44	do.[2]			0	1:8+		0	0	0	0	0	0	0	0	0	T	0	0	0	0	
44	do.[3]		0	T	1:16	0	0	0	0	T	0	0	0	T	0	1:8+	1:4+	0	0	0	0
52	do	0	0	0	0			<1:4	0		0	0	1:16+	0	0	0	0	0	0	0	
53	Diagnostic [4]		0	T	0			0	0	0	0	0	0	1:16+		0	0				
57	do.[5]				0				0	0	0	0				0	0	1:8+	0	0	0
59	Experimental [3]		0		0	T	0	0	<1:4	0	<1·4	0	0			0	0	<1:4	1:4+	1:16+	1:16
62	do.[3]	P	0		0	0	0	1:32+	0	0	0	0	1:8		0			0	0	0	0
64	do.[3]	0	0		0	0	0	0	0	0	0	0	0		0	0	T	0	0	0	0
66	do.[3]	0	0	0	0	0	0	1:16	T	0	0	0	1:8+	0	0	0	0	0	0	0	0
70	do.[3]	0	<1:4	0	0	0	0	<1:4	0	0	0	0	T	0	0	0	0	0	0	0	0
72	do.[3]	0	0	T	0		0	0		0	0	0	0	T		T	T	0	0	0	0
73	do.[3]	0	0	0			0	0		0	0	0	0	0			0	0	0	0	0
74	do.[3]	0	0	0			0	0		0	0	0	0	0	0		0	0	0	0	0
75	do.[3]	0	0	0			0	0		0	0	0	T	0			0	0	0	0	0

[1] Routinely submitted for release as type 6.
[2] Diagnostic antiserum prepared at Lederle Laboratories, Inc.
[3] Unabsorbed antiserum prepared at the New York City Laboratories
[4] Routinely submitted for release as type 11.
[5] Routinely submitted for release as type 19.

Type	Test antiserums	Types of pneumococci: 61 (Weingart) (42?)	62	63 (22A)	64 (23B)	65 (24A)	66 (35B) (Hoge)	67 (32A)	68 (9V?)	69 (39)	70 (40A) (33)	71 (26) (38)	72 (T)	73	74	75	Additional slight cross reactions shown by one or more other antiserums of the same type
1	Therapeutic (concentrated)	0	0	0	0	0	0	0	T	0	0	0	0	0	0	0	None.
2	do	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Type 5.
3	do	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	None.
4	do	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Do.
5	do	T	T	0	0	0	T	0	0	0	0	0	0	0	0	0	Types 4, 36.
6	do	T	T	0	0	0	0	0	0	0	0	0	0	0	0	0	Types 14, 15, 20, 30, 31, 34, 35, 36, 40, 54, 56.
7	do	0	0	0	0	0	0	0	0	T	0	0	0	0	0	0	Types 5, 11, 18, 36, 43, 44, 53, 55, 56.
8	do	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Types 7, 18, 23, 30, 33, 44, 45, 48, 50, 51, 54, 55, 56.
9	do	0	0	0	0	0	0	0	1:8+	0	0	0	0	0	0	0	Types 16, 19, 57, 58, 59
10	do	1:4+	1:4+	0	0	0	1:4+	0	0	P	0	0	0	0	0	0	Type 30.
11	do	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Types 4, 6, 17, 18, 44, 47, 49, 55, 56, 61, 62
12	do	0	0	0	0	0	0	0	0	0	0	0	0	T	0	0	Type 7.
13	do	T	T	0	0	0	<1:4	0	0	T	P	0	0	0	<1:4	0	Type 30.
14	do	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Types 2, 6, 26, 69.
15	do	P	P	0	0	0	T	0	0	T	0	0	0	0	0	0	Types 7, 17, 39, 51.
16	do	0	0	0	0	0	0	0	0	0	0	0	P	0	0	0	Types 4, 9, 21, 49.
17	do	0	0	1:8+	0	0	T	T	0	0	0	0	0	0	0	0	Types 46, 54.
18	do	P	0	0	T	0	T	0	0	0	0	0	0	0	0	0	Types 1, 9, 19, 23, 72.
19	do	0	0	0	0	0	0	0	0	T	0	0	0	0	0	0	Types 20, 29, 31, 32, 40, 47, 61, 62, 67.
20	do	1:64	1:64	0	T	0	1:4+	0	0	T	0	0	0	0	0	0	Types 11, 29, 43, 53.
21	do	0	T	0	0	0	<1:4	0	0	1:8	0	0	0	0	0	0	Type 16.
22	do	0	0	1:128	0	0	0	0	0	T	0	0	0	0	1:4	0	Types 22, 63, 66.
23	do	0	T	0	1:16+	0	0	1:4+	0	0	0	0	0	0	<1:4	0	Types 15, 27, 36.
24	do	0	0	T	0	1:32+	0	0	0	0	0	0	0	0	0	0	None.
25	do	0	0	0	0	0	0	0	0	T	0	P	0	0	0	0	Do.
26	Diagnostic [1]	------	0	------	------	0	------	------	------	------	------	------	------	------	------	------	None (only 2 diagnostic antiserums tested).

See footnotes at end of table.

TABLE 5.—*Capsular swelling reactions produced by antiserums of different types titrated with 75 types of pneumococci*—Continued

Type	Test antiserums	Types of pneumococci: 61 (Weingart) (42?)	62	63 (22A)	64 (23B)	65 (24A)	66 (35B) (Hoge)	67 (32A)	68 (9V?)	69 (39)	70 (40A) (33)	71 (26) (38)	72 (T)	73	74	75	Additional slight cross reactions shown by one or more other antiserums of the same type
27	Therapeutic (concentrated)	0	0	0	0	0	0	T	0	T	0	0	0	0	0	0	None.
28	do.	0	0	0	1:8+	0	T	0	0	T	0	0	0	0	0	0	Do.
29	do.	T	T	<1:4	T	0	1:64+	0	0	1:8	0	0	0	0	0	0	Type 5.
31	do.	1:32+	1:32+	P	0	0	0	0	0	0	0	0	0	0	0	0	Types 14, 15, 30.
32	do.	T	T	0	0	0	0	1.64+	0	0	0	0	0	0	<1:4	0	Type 30.
33	do.	0	0	0	0	0	0	0	1:128	T	0	0	0	0	T	0	Type 11.
34	do.	0	0	0	0	0	0	0	0	1:16+	0	0	0	0	0	T	None.
41	Experimental [2]	0	0				T		0	0	0						No other antiserums of the same type examined.
42	Diagnostic	0	0	0	0	0	0	0	0	0	1.4+		0	0	0	0	Do.
43	Experimental [3]	0	0	0	0				0	T			0				Do.
44	do. [3]	0	0		0		0		0				0				Do.
44	do. [2]	<1:4	0	0	0	0	0	0			0	0	T	0	0	0	Do.
52	do.	1:8	1:8	0			1:8		0	0	T				0	P	Types 11, 43.
53	Diagnostic [4]	0	0		0				0	T			0				No other antiserum of the same type examined.
57	do [5]								0								Do.
59	Experimental [3]	0	0	0	0	0	0	0		0	0	0		0	0	0	Do
62	do. [3]	1·32	1:32+	0	0	0	1:16+	0		T	0	0	0	0	0	0	Do.
64	do [3]	0	0	0	1·32	0	P	0	0	0	0	0	0	0	0	0	Do.
66	do. [2]	1:16	1.16	0	0	0	1:32+	0		T	P	0	0	0	0	0	Do.
70	do. [3]	0	P	0	0	0	P	0	0	0	1·16+	0	0	0	0	0	Do.
72	do. [3]	0	0	0	0	0	0	0	0	0	0	0	1:8+	0	0	0	Do.
73	do. [3]	0	0	0	0	0	0	0	0	0	T	0	0	1:8	0	0	Do
74	do. [3]	0	0	0	0	0	0	T	0	0	0	0	0	0	1:16	0	Do.
75	do. [3]	0	0	0	0	0	0	0	0	P	0	0	0	0	0	1:32+	Do.

[1] Routinely submitted for release as type 6.
[2] Diagnostic antiserum prepared at Lederle Laboratories, Inc.
[3] Unabsorbed antiserum prepared at the New York City Laboratories.
[4] Routinely submitted for release as type 11.
[5] Routinely submitted for release as type 19.

DISCUSSION

The identification of certain types of pneumococci by means of cross reactions given by selected unabsorbed heterologous type antiserums would not be practicable for the ordinary diagnostic laboratory but it can be recommended as a quick and easy method in larger laboratories which are frequently asked to classify types of pneumococci for which no specific diagnostic antiserums can be obtained. Also, it should be of use in the producing laboratory where the specificity of certain types of diagnostic antiserums may depend upon which of two closely related types of pneumococci are employed for testing and absorbing out cross reactions.

Cross reactions have been found with great regularity between certain types. For this reason it is important that all diagnostic antiserums should be tested for cross reactions with types which may be expected to show capsular swelling. In addition, it is desirable that antiserum for each of the types reported to be the most prevalent are tested for cross reactions with the remaining prevalent types. This would exclude reactions which might occur as the result of a long period of immunization, crosses in the serum of individual rabbits, or accidental mixtures of types.

Type incidence reports to a certain extent are dependent upon the specificity of the diagnostic antiserums and upon the number of infections diagnosed as being due to the pneumococcus. Thus, Avery, Chickering, Cole, and Dochez (*9*), in 1917, reported that 80 percent of all cases of lobar pneumonia in adults in New York were due to pneumococci, types 1, 2, and 3. Following the separation of the old group IV pneumococci into types 4 to 32, inclusive (*10*, *11*), the figures on the prevalence of types 1, 2, and 3 have been much lower (*12*). By means of diagnostic antiserums for two new types, Vammen (*3*) demonstrated in a half year in Denmark one type in 31 patients and 9 normal individuals; the other in 71 patients and 10 normal individuals. Rumreich and his associates (*13*), in a 2-year study of pneumococcic type incidence in six representative States of the Nation, observed that 10 of the types accounted for 74.6 percent of all types determined pneumococcic pneumonias. The use of more specific diagnostic antiserums should make possible even more accurate information on type incidence.

SUMMARY

All strains of pneumococci of the same type reacted in a similar manner with both homologous and heterologous type antiserums. Every new type of pneumococcus with the exception of one showed capsular swelling with antiserums of different heterologous types or the degree of the cross reactions was different.

The differences of the cross reactions have been used for identifying previously undetermined types of pneumococci and for differentiating closely related types.

There was considerable regularity in the cross reactions given by different antiserums of the same type. Data were presented to show the cross reactions exhibited by a potent, unabsorbed antiserum for each of the types commercially available and some cross reactions noted in antiserums for 17 types which have not been on the market.

Certain types of pneumococci were so similar that antiserum for one type could be used for one or more other types.

REFERENCES

(*1*) Walter, A., Blount, K. D., Beattie, M. W., and Cotler, H. Y.: A distinct type of pneumococcus immunologically related to type 9 (Cooper). J. Inf. Dis., **66**: 181–183 (1940).

(*2*) Walter, A. W., Guevin, V. H., Beattie, M. W., Cotler, H. Y., and Bucca, H. B.: Extension of the separation of types among the pneumococci: Description of 17 types in addition to types 1 to 32 (Cooper) with recommendations for terminology of all types reported through 1940. J. Immunol., **41**: 279–294 (1941).

(*3*) Vammen, B.: Serological variants of pneumococcus types 9 and 10. J. Immunol., **37**: 359–365 (1939).

(*4*) Kauffmann, F., Mørch, E., and Schmith, K.: On the serology of the pneumococcus group. J. Immunol., **39**: 397–426 (1940).

(*5*) Mørch, E.: Further studies on the serology of the pneumococcus group. J. Immunol., **43**: 177–202 (1942).

(*6*) Ordman, D.: Pneumococcus types in South Africa. A study of their occurrence and distribution in the population and the effect thereon of prophylactic inoculation. Publications South African Inst. of Med. Res., **9**: 1–27 (1938).

(*7*) Chinn, A. L., and Eddy, B. E.: Report of a new type of pneumococcus which crosses with types X, XI, XX, XXIX, and XXXI antipneumococcic serums. Pub. Health Rep., **56**: 62–75 (1941).

(*8*) Eddy, B. E.: A study of pneumococcus typing serums for the purpose of standardizing a test for potency. Pub. Health Rep., **55**: 347–361 (1940).

(*9*) Avery, O. T., Chickering, H. T., Cole, R., and Dochez, A. R.: Acute lobar pneumonia: Prevention and serum treatment. Rockefeller Inst. for Med. Res., Monographs of the Rockefeller Inst. for Med. Res., No. 7, New York, 1917. 110 pp.

(*10*) Cooper, G., Edwards, M., and Rosenstein, C.: The separation of types among the pneumococci hitherto called group IV and the development of therapeutic antiserums for these types. J. Exp. Med., **49**: 461–474 (1929).

(*11*) Cooper, G., Rosenstein, C., Walter, A., and Peizer, L.: The further separation of types among the pneumococci hitherto included in group IV and the development of therapeutic antisera for these types. J. Exp. Med., **55**: 531–554 (1932).

(*12*) Finland, M.: Present status of higher types of antipneumococcus serums. J. Am. Med. Assoc., **120**: 1294–1307 (1942).

(*13*) Rumreich, A. S., Shaughnessy, H. J., Mulcahy, J. V., Willett, J. C., Kellogg, W. H., and Mitchell, W. C.: A Nation-wide study of the bacterial etiology of the pneumonias. Pub. Health Rep., **58**: 121–135 (1943).

MENINGOCOCCUS MENINGITIS IN THE UNITED STATES DURING 1943

In 1943 the United States experienced the highest incidence of meningococcus meningitis during the 30 years since the Public Health Service began the collection of morbidity data for this disease in 1914. According to preliminary reports, a total of 17,974 cases was reported by the State health authorities of the 48 States and the District of Columbia, giving a case rate of 13.4 per 100,000 population. The next highest reported incidence was in 1929, in which year 10,551 cases were reported in 46 States and the District of Columbia, or an incidence rate of 8.7 per 100,000 population. Although a smaller number of States were reporting cases of meningococcus meningitis to the Public Health Service prior to 1929, the incidence rates for those years based on the figures furnished by the States reporting were below the rate for 1929.

Early in 1942 it was noted that the weekly figures for cases of meningococcus meningitis were exceeding the seasonal expectancy as based on 5-year medians. This excess incidence began during February of that year and continued and gradually increased during the remainder of 1942, reaching approximately three times the median in December. During January and February of 1943 the weekly figures were from four to nine times the median, and a total of 4,040 cases was reported by March 13, as compared with 3,774 cases for the entire year 1942. The accompanying tables show the morbidity and mortality data for meningitis for the country as a whole and the incidence rates per 100,000 population by geographic divisions from 1929 to 1943, inclusive.

TABLE 1.—*Number of cases of meningococcus meningitis and deaths from the same cause, with rates per 100,000 population, reported in the United States, 1929 to 1943, inclusive*

Year	Number of States reporting	Cases	Cases per 100,000 population	Deaths	Deaths per 100,000 population
1929	46	10,551	8.7	5,171	4.5
1930	44	8,384	7.0	4,171	3.6
1931	40	5,426	4.7	2,806	2.4
1932	41	3,102	2.8	1,651	1.4
1933	44	2,913	2.4	1,482	1.2
1934	45	2,500	2.0	1,272	1.0
1935	43	5,736	4.7	2,657	2.1
1936	44	7,320	5.9	3,020	2.4
1937	44	5,484	4.3	2,208	1.7
1938	47	2,919	2.3	1,024	.8
1939	47	1,993	1.5	863	.7
1940	48	1,665	1.3	694	.5
1941	48	2,039	1.5	713	.5
1942	48	3,826	2.9	938	.7
1943	48	17,974	13.4	(1)	[2] 2.2

[1] Total deaths not available.
[2] Average of monthly rates for a 10-percent sample of death certificates (Bureau of the Census) and subject to errors of sampling.

TABLE 2.—*Case rates for meningococcus meningitis per 100,000 population* [1]

Geographic division	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938	1939	1940	1941	1942	[2] 1943
New England	4.0	3.8	2.3	1.8	1.2	1.4	2.0	4.1	3.4	1.4	1.1	1.2	1.8	5.4	**24.1**
Middle Atlantic	7.8	5.3	4.5	2.5	1.7	1.3	3.8	4.4	3.2	1.8	1.7	1.4	1.6	3.8	**16.6**
East North Central	12.6	8.9	5.3	3 7	3.5	2.5	5.3	4.4	2.8	1.4	0.9	0.8	0.9	1.1	9.6
West North Central	9.1	7.6	4.9	2.6	3.0	2.6	5.5	4.0	2.7	1.7	1.0	1.0	1.0	1.1	9.0
South Atlantic	2.9	4.0	3.5	2.3	2.1	2.2	7.3	11.2	8.1	3.8	1.9	1.8	2.4	4.3	15.6
East South Central	2.9	11.7	8.0	2.9	2.3	2.0	4.9	11.4	9.4	5.9	2.7	2.1	2.6	2.5	12.1
West South Central	4.5	3.0	1.8	1.5	1.9	1.8	2.9	5.0	4.1	1.8	1.4	1.2	1.5	2.4	6.7
Mountain	40.1	22.8	7.8	4.8	3.2	3.6	6 4	8.1	4.7	3.6	3.8	1.7	1.4	2.3	12.2
Pacific	13.8	6.4	4.4	2.5	2.1	1.6	4.5	4.3	3.5	1.6	1.2	1.0	1.3	4.4	**17.1**
United States	8.7	7.0	4.7	2.8	2.4	2.0	4.7	5.9	4.3	2.3	1.5	1.3	1.5	2.9	13.4

[1] For the years 1940–42 the enumerated population of 1940 was used. For 1943, estimated populations were used.
[2] Based on preliminary weekly telegraphic reports.

The incidence rate for the country as a whole was 50 percent higher in 1943 than in 1929. The highest rates were recorded in the New England, Middle Atlantic, and Pacific areas. As shown in table 2, the rates for all but three geographic areas were higher in 1943 than in 1929, and the rates for all areas except the Mountain were higher in 1943 than for any other year since 1929 (the highest rate and the two rates next in numerical order are printed in bold-face type.) [1]

The outstanding difference between the two epidemic years is in the case fatality ratios. In 1929 the case fatality for meningococcus meningitis was about 50 percent, on the basis of total reports and reports from several individual States in which the cases were considered to be fairly completely reported. Figures for total deaths from meningococcus meningitis during 1943 are not yet available; but on the basis of the average of the monthly rates for a 10-percent sample of death certificates, issued by Bureau of the Census, and the incidence rate the case fatality ratio was 16.4. While not strictly comparable, but probably more nearly complete, the reports for 1943 for 32 cities scattered throughout the United States give a case fatality of 18.4 percent. The ratio for California was 16.9, while that for New York City was 16.0. In a severe epidemic in Chile in 1941–42, the case fatality was also 16.0 percent.[2]

It would appear that the greater part of the recent reduction in the fatality for meningococcus meningitis is due to the introduction of chemotherapy. There is abundant evidence of the effectiveness of sulfonamide therapy. Prior to the use of the sulfonamides in the treatment of meningococcus meningitis, the case fatality had dropped to between 30 and 40 percent. Col. Henry M. Thomas, Jr., in a report of the treatment of 1,935 cases occurring in the Army in several Southeastern States during the winter of 1942–43, states

[1] For rates by geographic areas for prior years, see The Movements of Epidemic Meningitis 1915–30, by A. W. Hedrich, Pub. Health Rep., Nov. 13, 1931, pp. 2709–2726. The slight difference between some of the rates given here and those given by Dr. Hedrich for 1929 and 1930 is probably due to the use of different States.

[2] Am. J. Pub. Health, March 1944, pp. 231–233.

that the case fatality was only 3.3 percent, as compared with a fatality of 39 percent for about 6,000 cases in the First World War.[3] It should be noted that the military group was composed of individuals in the young adult ages, in excellent physical condition, and subject to immediate hospitalization on the first signs of illness. It would be expected, therefore, that the fatality would be higher in the civilian population. It is interesting to note that the Army reports also point out the prophylactic value of the administration of sulfadiazine by mouth even in small doses.[4]

INCIDENCE IN 1944

Up to the week ended March 25, 1944, a total of 6,637 cases of meningococcus meningitis had been reported as compared with 5,139 cases for the same period in 1943. A larger number of cases has been reported in 1944 than in 1943 for each week up to the week ended March 11, when the current weekly figure dropped below that for 1943. The largest number of weekly cases reported in 1943 was 614 for the week ended March 20 (corresponding to the week ended March 18, 1944), while the largest number of cases reported for any week this year up to March 25 was 645 for the week ended January 15, although a high level has been maintained for subsequent weeks. While the peak week for 1943 occurred in March, a larger number of cases was reported during the second quarter of that year than in the first quarter.

A break in the downward trend during the 2 preceding weeks was recorded for the week ended March 25, 1944, although the incidence continued below that for the corresponding week of last year. On the basis of the seasonal pattern of meningococcus meningitis, an interrupted but general decline in the number of cases may now be expected.

TABLE 3.—*Number of cases of meningococcus meningitis reported, by weeks, in 1944 as compared with 1943*

Year	January				February				March				Total
	8	15	22	29	5	12	19	26	4	11	18	25	
1944	580	645	521	527	571	562	529	552	586	517	497	550	6,637
Corresponding week, 1943	278	309	356	339	330	403	398	484	531	525	614	572	[1] 5,139

[1] Not including delayed reports not assignable by weeks.

[3] J. Am. Med. Assoc., October 2, 1943, pp. 264-272.

[4] J. Am. Med. Assoc., October 9, 1943, pp. 333-339.

INCIDENCE OF HOSPITALIZATION, NOVEMBER, DECEMBER 1943, JANUARY, FEBRUARY 1944

Through the cooperation of the Hospital Service Plan Commission of the American Hospital Association, data on hospital admissions among about 10,000,000 members of Blue Cross Hospital Service Plans are presented monthly. These plans provide prepaid hospital service. The data cover about 60 hospital service plans scattered throughout the country, mostly in large cities.

Item	November	
	1942	1943
1. Number of plans supplying data	60	68
2. Number of persons eligible for hospital care	8,308,004	11,478,284
3. Number of persons admitted for hospital care	67,905	94,495
4. Incidence per 1,000 persons, annual rate, during current month (daily rate × 365)	99.3	100.2
5. Incidence per 1,000 persons, annual rate for the 12 months ended Nov. 30	108.1	105.1
	December	
1. Number of plans supplying data	65	58
2. Number of persons eligible for hospital care	9,483,924	10,175,351
3. Number of persons admitted for hospital care	75,195	78,676
4. Incidence per 1,000 persons, annual rate, during current month (daily rate × 365)	93.3	89.4
5. Incidence per 1,000 persons, annual rate for the 12 months ended Dec. 31	107.9	104.8
	January	
	1943	1944
1. Number of plans supplying data	58	48
2. Number of persons eligible for hospital care	8,545,423	8,900,268
3. Number of persons admitted for hospital care	71,777	72,305
4. Incidence per 1,000 persons, annual rate, during current month (daily rate × 365)	98.8	94.9
5. Incidence per 1,000 persons, annual rate for the 12 months ended Jan. 31	107.6	104.5
	February	
1. Number of plans supplying data	65	54
2. Number of persons eligible for hospital care	9,739,448	10,231,853
3. Number of persons admitted for hospital care	76,661	80,500
4. Incidence per 1,000 persons, annual rate, during current month (daily rate × 365)	102.6	105.6
5. Incidence per 1,000 persons, annual rate for the 12 months ended Feb. 29	108.3	104.8

DEATHS DURING WEEK ENDED MARCH 25, 1944

[From the Weekly Mortality Index, issued by the Bureau of the Census, Department of Commerce]

	Week ended Mar. 25, 1944	Corresponding week, 1943
Data for 93 large cities of the United States:		
Total deaths	9,605	9,979
Average for 3 prior years	9,342	
Total deaths, first 12 weeks of year	122,809	122,503
Deaths under 1 year of age	603	708
Average for 3 prior years	637	
Deaths under 1 year of age, first 12 weeks of year	7,588	8,742
Data from industrial insurance companies:		
Policies in force	66,368,639	65,462,918
Number of death claims	12,665	13,135
Deaths claims per 1,000 policies in force, annual rate	10.0	10.5
Death claims per 1,000 policies, first 12 weeks of year, annual rate	11.4	10.7

PREVALENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED APRIL 1, 1944

Summary

The incidence of meningococcus meningitis continues high, but for the fourth successive week is below that for last year. A total of 549 cases was reported for the week, as compared with 550 last week, 595 for the corresponding week last year, and a 5-year (1939–43) median of 57. Of the total, 260 cases, or 47 percent, were reported in the Middle Atlantic and East North Central areas. Nine States reporting 19 or more cases currently are as follows (last week's figure in parentheses): *Increases*—New York 63 (56), New Jersey 24 (20), Pennsylvania 37 (27), Ohio 56 (37); *decreases*—Illinois 28 (44), Michigan 28 (35), Tennessee 19 (33), California 44 (47); *no change*—Missouri 27 (27).

The cumulative total for the first 13 weeks of the year is 7,186, as compared with 5,918 and 3,437 for the comparable period in 1943 and 1930, respectively, the largest numbers reported for the same period in any prior years.

The incidence of measles and scarlet fever increased during the week to 34,092 and 7,727 cases, respectively, or 5 per cent increase in each instance, as compared with the slight decreases in the preceding week. The cumulative totals for the first quarter of the year are 306,317 and 76,814, as compared with 210,408 and 51,038 for the same period last year and 5-year medians of 204,951 and 52,173, respectively.

Current figures for diphtheria, influenza, poliomyelitis, smallpox, typhoid fever, and whooping cough are below the respective 5-year medians. The cumulative figure for poliomyelitis for the first quarter of the year is lower than for the same period of any of the past 4 years, while the figures for diphtheria, smallpox, and whooping cough are lower than the comparable figures for any prior year of record. The cumulative figure for typhoid fever is lower than for the same period of any prior year of record except 1943.

Deaths registered for the week in 93 large cities of the United States totaled 9,476, as compared with 9,605 last week and a 3-year (1941–43) average of 9,139. The cumulative figure for the year to date is 132,285, as compared with 132,498 for the same period last year.

Telegraphic morbidity reports from State health officers for the week ended April 1, 1944, and comparison with corresponding week of 1943 and 5-year median

In these tables a zero indicates a definite report, while leaders imply that, although none was reported, cases may have occurred.

Division and State	Diphtheria			Influenza			Measles			Meningitis, meningococcus		
	Week ended		Median 1939–43	Week ended		Median 1939–43	Week ended		Median 1939–43	Week ended		Median 1939–43
	Apr. 1, 1944	Apr. 3, 1943		Apr. 1, 1944	Apr. 3, 1943		Apr. 1, 1944	Apr. 3, 1943		Apr. 1, 1944	Apr. 3, 1943	
NEW ENGLAND												
Maine	0	0	1	------	------	1	294	8	41	0	8	1
New Hampshire	0	0	0	------	5	------	0	60	60	0	1	0
Vermont	1	0	0	------	------	------	171	470	43	1	1	0
Massachusetts	2	3	3	------	------	------	1,196	1,665	1,008	16	23	3
Rhode Island	1	1	0	------	1	------	269	11	11	5	17	0
Connecticut	2	1	1	------	5	6	471	455	365	12	9	1
MIDDLE ATLANTIC												
New York	12	17	17	[1] 6	19	19	2,799	2,826	1,467	63	68	4
New Jersey	2	6	6	21	9	9	1,684	1,653	461	24	39	1
Pennsylvania	14	7	11	5	5	------	1,424	2,394	1,081	37	38	7
EAST NORTH CENTRAL												
Ohio	3	13	9	9	7	16	2,135	1,227	354	56	7	2
Indiana	5	3	6	15	44	33	294	761	125	13	9	1
Illinois	15	22	22	14	11	33	1,271	1,378	227	28	21	1
Michigan [2]	8	5	5	7	4	4	1,295	1,301	393	28	18	2
Wisconsin	1	1	0	55	36	202	2,737	1,563	870	11	12	1
WEST NORTH CENTRAL												
Minnesota	5	3	1	------	------	3	1,354	126	214	5	4	0
Iowa	2	5	5	31	------	9	165	341	270	6	2	0
Missouri	0	4	4	3	8	8	415	369	146	27	12	0
North Dakota	0	0	1	8	3	3	148	56	44	0	0	0
South Dakota	3	10	1	------	------	1	37	178	13	0	0	0
Nebraska	2	0	4	9	29	2	125	196	190	1	0	0
Kansas	8	7	4	8	3	12	814	629	629	8	4	1
SOUTH ATLANTIC												
Delaware	1	0	0	------	------	------	22	95	3	5	2	0
Maryland [2]	1	16	3	25	8	41	1,139	140	393	5	22	1
District of Columbia	0	0	1	1	1	2	125	75	91	5	5	1
Virginia	5	3	6	259	556	484	695	621	421	5	31	3
West Virginia	5	1	6	4	119	119	666	90	90	9	4	3
North Carolina	4	8	11	26	71	57	2,028	93	808	3	18	2
South Carolina	0	3	5	346	473	605	604	175	175	12	15	2
Georgia	7	4	5	35	48	90	330	264	263	4	7	2
Florida	3	2	4	6	5	13	416	69	193	1	2	2
EAST SOUTH CENTRAL												
Kentucky	2	3	6	13	7	26	105	543	111	13	20	4
Tennessee	4	3	3	57	74	153	378	540	129	19	18	2
Alabama	7	7	7	76	324	328	531	320	257	5	9	3
Mississippi [2]	1	2	8	------	------	------	------	------	------	10	43	2
WEST SOUTH CENTRAL												
Arkansas	2	4	4	87	62	201	264	157	157	4	1	1
Louisiana	0	3	3	5	8	8	121	240	189	5	7	1
Oklahoma	2	1	4	214	78	197	95	107	107	3	1	1
Texas	34	29	29	1,143	1,129	1,154	3,039	1,297	1,297	18	20	2
MOUNTAIN												
Montana	0	2	1	13	52	43	262	374	150	1	0	0
Idaho	0	0	0	------	------	------	29	27	39	2	0	0
Wyoming	2	1	1	12	26	1	104	213	126	0	1	0
Colorado	3	14	8	40	31	31	354	720	272	12	4	0
New Mexico	0	0	0	7	------	1	150	12	53	7	0	0
Arizona	2	1	2	59	98	137	308	31	104	2	0	0
Utah [2]	0	0	0	15	9	13	28	252	235	0	1	0
Nevada	0	0	0	------	3	------	0	21	9	0	0	0
PACIFIC												
Washington	6	7	1	6	2	1	261	775	703	8	6	1
Oregon	5	1	2	26	22	24	135	453	361	6	7	1
California	33	19	17	109	70	220	2,705	812	812	44	58	2
Total	210	242	274	2,770	3,465	4,087	34,092	26,183	21,924	549	595	57
13 weeks	3,212	3,679	4,037	320,567	57,434	113,646	306,417	210,408	204,951	7,186	5,826	682

See footnotes at end of table.

Telegraphic morbidity reports from State health officers for the week ended April 1, 1944, and comparison with corresponding week of 1943 and 5-year median—Con.

Division and State	Poliomyelitis			Scarlet fever			Smallpox			Typhoid and paratyphoid fever [4]		
	Week ended		Median 1939–43	Week ended		Median 1939–43	Week ended		Median 1939–43	Week ended		Median 1939–43
	Apr. 1, 1944	Apr. 3, 1943		Apr. 1, 1944	Apr. 3, 1943		Apr. 1, 1944	Apr. 3, 1943		Apr. 1, 1944	Apr. 3, 1943	
NEW ENGLAND												
Maine	0	0	0	46	13	13	0	0	0	0	1	0
New Hampshire	0	0	0	21	10	7	0	0	0	1	0	0
Vermont	0	0	0	11	10	11	0	0	0	0	0	0
Massachusetts	0	0	0	431	568	171	0	0	0	0	2	2
Rhode Island	0	0	0	14	17	17	0	0	0	0	0	0
Connecticut	0	0	0	93	93	86	0	0	0	0	0	0
MIDDLE ATLANTIC												
New York	1	0	0	749	559	640	0	0	0	3	4	6
New Jersey	0	0	0	283	204	204	0	0	0	1	1	1
Pennsylvania	1	2	0	750	350	400	0	0	0	2	0	7
EAST NORTH CENTRAL												
Ohio	0	0	0	489	314	414	0	1	2	4	2	2
Indiana	0	2	0	230	154	190	0	2	2	1	0	0
Illinois	0	0	1	582	271	483	0	1	3	0	6	3
Michigan [3]	0	0	0	388	119	310	0	0	0	2	3	2
Wisconsin	1	0	0	433	339	175	0	0	3	0	0	0
WEST NORTH CENTRAL												
Minnesota	0	0	0	219	33	80	0	0	2	0	1	0
Iowa	0	0	0	200	59	64	1	1	4	2	0	0
Missouri	0	0	0	160	80	40	0	0	3	0	1	1
North Dakota	0	0	0	56	5	9	0	0	0	0	0	0
South Dakota	1	0	0	21	11	13	0	0	0	0	0	0
Nebraska	0	0	0	43	29	44	0	0	0	0	0	0
Kansas	0	0	0	126	74	74	0	1	1	0	0	0
SOUTH ATLANTIC												
Delaware	0	0	0	22	9	10	0	0	0	0	0	0
Maryland [3]	0	0	0	230	146	49	0	0	0	0	5	2
District of Columbia	0	1	0	159	20	16	0	0	0	0	0	0
Virginia	0	0	0	112	43	32	0	0	0	2	2	2
West Virginia	0	0	0	108	21	41	0	0	0	1	0	2
North Carolina	0	0	0	29	32	32	0	0	0	0	0	1
South Carolina	0	0	0	5	5	5	1	1	0	2	1	1
Georgia	1	0	0	30	15	15	0	9	1	4	1	2
Florida	1	0	1	13	7	8	0	0	0	3	1	2
EAST SOUTH CENTRAL												
Kentucky	1	3	0	83	51	71	0	0	0	1	0	1
Tennessee	0	0	0	60	45	67	0	0	0	1	3	2
Alabama	0	0	0	15	43	18	0	0	1	1	2	3
Mississippi [3]	0	1	1	6	10	7	1	1	0	2	1	2
WEST SOUTH CENTRAL												
Arkansas	1	0	0	20	5	5	0	1	1	1	1	1
Louisiana	1	0	0	7	13	7	0	0	1	1	2	5
Oklahoma	0	0	0	13	17	17	1	0	1	0	1	1
Texas	4	0	0	140	162	60	1	13	13	7	3	5
MOUNTAIN												
Montana	0	0	1	90	16	29	4	0	0	0	0	0
Idaho	0	0	0	43	7	7	0	0	0	0	0	0
Wyoming	0	0	0	10	58	19	0	0	0	0	0	0
Colorado	1	0	0	71	39	37	0	0	0	0	0	0
New Mexico	0	0	0	29	3	4	0	0	0	0	4	2
Arizona	0	[3] 3	0	28	19	9	0	0	0	0	0	0
Utah [3]	0	1	0	125	49	23	0	0	0	0	0	0
Nevada	0	0	0	5	1	0	0	0	0	0	0	0
PACIFIC												
Washington	1	1	0	372	40	24	1	0	0	3	4	0
Oregon	0	0	0	166	12	12	0	0	1	0	1	0
California	3	5	1	391	136	136	0	0	0	17	1	3
Total	18	[3] 19	19	7,727	4,336	4,465	10	31	48	62	54	77
13 weeks	295	340	330	76,814	51,038	52,173	162	350	605	954	692	993

See footnotes at end of table.

Telegraphic morbidity reports from State health officers for the week ended April 1, 1944, and comparison with corresponding week of 1943 and 5-year median—Con.

Division and State	Whooping cough			Week ended Apr. 1, 1944								
	Week ended		Median 1939–43	Anthrax	Dysentery			Encephalitis, infectious	Leprosy	Rocky Mt. spotted fever	Tularemia	Typhus fever
	Apr. 1, 1944	Apr. 3, 1943			Amebic	Bacillary	Unspecified					
NEW ENGLAND												
Maine	0	60	54	0	0	0	0	0	0	0	0	0
New Hampshire	0	23	10	0	0	0	0	0	0	0	0	0
Vermont	37	27	34	0	0	0	0	0	0	0	0	0
Massachusetts	79	179	196	0	0	17	0	1	0	0	0	0
Rhode Island	6	43	43	0	0	0	0	0	0	0	0	0
Connecticut	28	51	67	0	1	0	0	1	0	0	0	0
MIDDLE ATLANTIC												
New York	101	405	405	0	2	8	0	0	0	0	0	0
New Jersey	54	205	180	0	0	0	0	1	0	1	0	0
Pennsylvania	96	311	349	1	2	0	0	0	0	0	0	0
EAST NORTH CENTRAL												
Ohio	50	181	209	0	0	1	0	0	0	0	0	0
Indiana	14	83	33	0	0	0	0	0	0	0	0	0
Illinois	37	111	118	0	1	0	0	0	1	1	0	0
Michigan [2]	98	253	174	0	1	0	0	0	0	0	0	0
Wisconsin	53	190	146	0	0	0	0	0	0	0	1	0
WEST NORTH CENTRAL												
Minnesota	29	78	49	0	4	0	0	0	0	0	0	0
Iowa	11	18	18	0	0	0	0	0	0	0	0	0
Missouri	10	8	8	0	0	0	0	0	0	0	0	0
North Dakota	2	16	16	0	0	0	0	0	0	0	0	0
South Dakota	0	5	2	0	0	0	0	0	0	0	0	0
Nebraska	7	8	9	0	0	0	0	0	0	0	0	0
Kansas	37	109	49	0	0	0	0	0	0	0	0	0
SOUTH ATLANTIC												
Delaware	0	6	7	0	0	0	0	0	0	0	0	0
Maryland [3]	28	109	80	0	0	0	0	1	0	0	0	0
District of Columbia	2	42	15	0	0	0	0	0	0	0	0	0
Virginia	54	85	53	0	0	0	98	0	0	0	0	0
West Virginia	53	106	69	0	0	0	0	0	0	0	0	0
North Carolina	112	179	179	0	0	0	0	0	0	0	0	1
South Carolina	72	32	96	0	0	3	0	0	0	0	1	1
Georgia	20	42	29	0	0	3	0	0	0	0	2	5
Florida	18	30	23	0	0	0	0	1	0	0	0	1
EAST SOUTH CENTRAL												
Kentucky	27	49	50	0	1	0	0	0	0	0	0	0
Tennessee	11	111	46	0	0	0	0	0	0	0	0	0
Alabama	31	52	52	0	0	0	0	0	0	0	3	5
Mississippi [2]	-----	-----	-----	0	0	0	0	0	0	0	0	0
WEST SOUTH CENTRAL												
Arkansas	13	26	18	0	0	0	0	0	0	0	1	0
Louisiana	0	10	12	0	1	1	0	0	0	0	0	0
Oklahoma	5	33	9	0	0	0	0	0	0	0	0	0
Texas	200	545	243	0	24	199	0	1	0	0	0	15
MOUNTAIN												
Montana	10	16	9	0	0	0	0	0	0	0	1	0
Idaho	11	5	5	0	0	0	0	0	0	0	0	0
Wyoming	5	2	2	0	1	0	0	0	0	0	0	0
Colorado	22	11	55	0	0	0	0	0	0	0	0	0
New Mexico	10	13	31	0	0	0	2	0	0	0	0	0
Arizona	52	29	29	0	1	0	11	0	0	0	0	0
Utah [2]	32	51	51	0	0	0	0	0	0	0	0	0
Nevada	6	0	0	0	0	0	0	0	0	0	0	0
PACIFIC												
Washington	34	30	38	0	0	0	0	0	0	0	0	0
Oregon	35	27	24	0	0	0	0	0	0	0	0	0
California	92	394	283	0	1	5	0	1	0	0	0	1
Total	1,764	4,399	4,110	1	40	237	111	7	1	2	9	29
13 weeks	23,873	51,424	51,424	12	357	2,589	856	133	9	4	134	504

[1] New York City only.
[2] Period ended earlier than Saturday.
[3] Exclusive of delayed report of one case in Arizona.
[4] Including paratyphoid fever cases reported separately as follows: New York, 1; Michigan, 1; Florida, 1; Tennessee, 1; Washington, 1; California, 15.

WEEKLY REPORTS FROM CITIES

City reports for week ended March 18, 1944

This table lists the reports from 87 cities of more than 10,000 population distributed throughout the United States and represents a cross section of the current urban incidence of the diseases included in the table.

	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
NEW ENGLAND												
Maine:												
Portland	0	0	------	0	25	3	5	0	5	0	1	0
New Hampshire:												
Concord	0	0	------	1	2	0	1	0	0	0	0	1
Vermont:												
Barre	0	0	------	0	0	0	0	0	0	0	0	0
Massachusetts:												
Boston	1	0	------	1	96	8	19	0	93	0	0	18
Fall River	0	0	------	0	25	1	5	0	2	0	1	2
Springfield	0	0	------	0	47	0	0	0	44	0	0	6
Worcester	0	0	------	0	0	0	8	0	79	0	0	5
Rhode Island:												
Providence	0	0	------	0	228	2	6	0	5	0	0	1
Connecticut:												
Bridgeport	0	0	2	2	27	0	2	0	3	0	0	0
Hartford	1	0	------	0	2	0	1	0	13	0	0	0
New Haven	0	0	2	0	148	1	0	0	4	0	0	8
MIDDLE ATLANTIC												
New York:												
Buffalo	1	0	------	0	3	0	5	0	15	0	0	2
New York	6	1	6	4	1,840	26	79	0	342	0	4	40
Rochester	0	0	------	0	2	4	4	0	[illegible]	0	0	0
Syracuse	0	0	------	0	1	1	7	0	3	0	0	8
New Jersey:												
Camden	1	0	1	1	6	1	2	0	49	0	0	0
Newark	0	0	2	1	114	3	11	0	30	0	0	6
Trenton	0	0	6	0	14	0	5	0	8	0	0	0
Pennsylvania:												
Philadelphia	2	0	9	6	29	14	31	0	111	0	0	14
Pittsburgh	0	0	5	3	103	5	14	0	21	0	0	7
Reading	0	0	------	0	3	0	4	0	7	0	0	0
EAST NORTH CENTRAL												
Ohio:												
Cincinnati	4	0	------	0	52	7	7	0	47	0	0	0
Cleveland	0	0	4	2	696	4	19	0	105	0	1	12
Columbus	0	0	1	1	151	0	2	0	8	0	0	3
Indiana:												
Fort Wayne	0	0	------	0	0	0	2	0	6	0	0	0
Indianapolis	8	0	------	0	22	4	8	0	80	0	0	2
South Bend	0	0	------	0	7	0	0	0	9	0	0	0
Terre Haute	0	0	------	0	0	0	0	0	0	0	0	0
Illinois:												
Chicago	1	0	1	1	73	16	30	1	196	0	0	10
Springfield	0	0	4	0	63	1	2	0	2	0	0	1
Michigan:												
Detroit	3	0	1	1	101	16	14	0	126	0	0	20
Flint	1	0	------	0	7	1	3	0	4	0	0	1
Grand Rapids	0	0	------	0	179	0	3	0	14	0	0	0
Wisconsin:												
Kenosha	0	0	------	0	11	0	0	0	7	0	0	0
Milwaukee	0	0	------	0	80	0	6	0	77	0	0	12
Racine	0	0	------	0	17	0	3	0	2	0	0	4
Superior	0	0	------	0	7	0	0	0	22	0	0	0
WEST NORTH CENTRAL												
Minnesota:												
Duluth	0	0	------	0	15	0	1	0	32	0	0	7
Minneapolis	2	0	------	1	485	3	10	0	49	0	0	5
St. Paul	1	0	------	1	775	1	5	0	27	0	0	10

City reports for week ended March 18, 1944—Continued

	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
WEST NORTH CENTRAL—continued												
Missouri:												
Kansas City	0	0		0	44	3	7	0	32	0	0	1
St. Joseph	0	0		0	6	0	0	0	5	0	0	0
St. Louis	0	0	2	1	209	11	13	0	43	0	1	7
Nebraska:												
Omaha	2	0		0	17	0	7	0	55	0	0	0
Kansas:												
Topeka	1	0		0	17	0	0	0	3	0	0	3
Wichita	0	0		0	215	0	6	0	6	0	0	2
SOUTH ATLANTIC												
Delaware:												
Wilmington	0	0		1	3	0	8	0	2	0	0	0
Maryland:												
Baltimore	5	0	6	4	974	6	13	0	111	0	1	31
Cumberland	0	0		0	0	0	0	0	0	0	0	1
Frederick	0	0		0	0	0	0	0	0	0	0	0
District of Columbia:												
Washington	0	0	1	1	129	1	11	0	222	0	0	3
Virginia:												
Lynchburg	0	0	3	0	9	0	1	0	2	0	1	5
Richmond	0	0		0	261	3	3	0	3	0	0	0
Roanoke	0	0		0	82	0	0	0	1	0	0	9
West Virginia:												
Charleston	0	0		0	2	1	0	0	7	0	0	0
Wheeling	0	1		0	17	1	1	0	23	0	0	0
North Carolina:												
Winston-Salem	0	0		0	44	0	1	0	1	0	0	0
South Carolina:												
Charleston	0	0	16	0	34	2	2	0	1	0	0	0
Georgia:												
Atlanta	0	0	20	1	43	1	0	0	5	0	1	0
Brunswick	0	0		0	4	0	1	0	0	0	0	0
Savannah	0	0		0	8	2	1	0	2	0	0	0
Florida:												
Tampa	0	0		0	7	1	4	0	1	0	1	0
EAST SOUTH CENTRAL												
Tennessee:												
Memphis	1	0	6	1	24	4	3	0	26	0	0	10
Nashville	0	0		0	6	0	0	0	8	0	0	1
Alabama:												
Birmingham	0	0	6	0	23	1	7	0	0	0	0	2
Mobile	1	0		1	0	0	2	0	0	0	0	0
WEST SOUTH CENTRAL												
Arkansas:												
Little Rock	1	0	3	0	57		1	0	1	0	0	0
Louisiana:												
New Orleans	1	0	17	3	37	3	6	0	10	0	0	0
Shreveport	1	0		0	0	0	5	0	2	0	0	0
Texas:												
Dallas	3	0	1	1	169	0	1	0	6	0	1	0
Galveston	0	0		0	2	0	2	0	0	0	0	0
Houston	3	0		0	37	0	5	0	1	0	0	0
San Antonio	2	0	1	1	37	4	9	1	1	0	0	1
MOUNTAIN												
Montana:												
Billings	0	0		0	3	0	0	0	0	0	0	0
Great Falls	0	0		0	10	0	0	0	7	0	0	0
Helena	0	0		0	0	0	0	0	0	0	0	0
Missoula	0	0		0	0	0	1	0	1	0	0	0
Idaho:												
Boise	0	0		0	1	0	0	0	2	0	0	0
Colorado:												
Denver	0	0	10	0	172	0	7	0	31	0	0	17
Pueblo	0	0		0	40	0	1	0	2	0	0	0

City reports for week ended March 18, 1944—Continued

	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
MOUNTAIN—continued												
Utah:												
Salt Lake City	0	0	-----	0	9	0	2	0	26	0	0	0
PACIFIC												
Washington:												
Seattle	0	0	----	0	0	0	5	0	0	0	0	0
Spokane	0	0	----	0	73	1	3	0	20	0	0	0
Tacoma	1	0	----	0	7	1	6	0	68	0	0	0
California:												
Los Angeles	7	0	16	4	308	4	8	1	42	0	1	10
Sacramento	0	0	-----	0	22	2	1	0	4	0	0	7
San Francisco	0	0	10	1	82	0	12	2	38	0	1	10
Total	61	2	162	46	8,700	174	484	5	2,478	0	15	325
Corresponding week, 1943	66	2	254	84	6,460	168	527	4	1,746	0	9	1,156
Average, 1939-43	76	------	470	[1] 44	[2] 4,743	------	[1] 517	------	1,537	8	18	1,091

[1] 3-year average.
[2] 5-year median.

Dysentery, amebic.—Cases: New York, 2; Philadelphia, 4; Chicago, 1; St. Louis, 1; Charleston, S. C., 2 Memphis, 1; Dallas, 1.
Dysentery, bacillary.—Cases: Providence, 1; Richmond, 1; Charleston, S. C., 6; Los Angeles, 5.
Dysentery, unspecified.—Cases: San Antonio, 1.
Leprosy.—Cases: Tampa, 1.
Typhus fever.—Cases: Atlanta, 1; New Orleans, 1.

Pates (annual basis) per 100,000 population, by geographic groups, for the 87 cities in the preceding table (estimated population, 1942, 34,648,700)

	Diphtheria case rates	Encephalitis, infectious, case rates	Influenza		Measles case rates	Meningitis, meningococcus, case rates	Pneumonia death rates	Poliomyelitis case rates	Scarlet fever case rates	Smallpox case rates	Typhoid and paratyphoid fever case rates	Whooping cough case rates
			Case rates	Death rates								
New England	5.0	0.0	10.0	10.0	1,495	37.4	117.1	0.0	618	0.0	5.0	102
Middle Atlantic	4.5	0.4	13.0	6.7	946	24.1	72.4	0.0	267	0.0	1.8	34
East North Central	10.0	0.0	6.4	2.9	858	28.7	58.0	0.6	413	0.0	0.6	38
West North Central	11.9	0.0	4.0	5.9	3,536	35.7	97.2	0.0	500	0.0	2.0	69
South Atlantic	8.7	1.7	80.0	12.2	2,814	31.3	80.0	0.0	663	0.0	7.0	85
East South Central	11.9	0.0	71.5	11.9	316	29.8	71.5	0.0	202	0.0	0.0	77
West South Central	32.4	0.0	64.7	14.7	997	20.6	85.3	2.9	62	0.0	2.9	3
Mountain	0.0	0.0	80.6	0.0	1,894	0.0	88.7	0.0	556	0.0	0.0	137
Pacific	14.0	0.0	45.6	8.8	862	14.0	50.8	5.3	301	0.0	3.5	47
Total	9.2	0.3	24.4	6.9	1,313	26.3	78.0	0.8	374	0.0	2.3	49

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—Week ended March 4, 1944.—During the week ended March 4, 1944, cases of certain communicable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox		14		199	472	79	40	126	170	1,100
Diphtheria	3	8	3	30	1	2		1	1	49
Dysentery (bacillary)				1						1
Encephalitis, infectious									2	2
German measles		9	8	43	23	14	56	9	47	209
Influenza		22	3		153	1	4		55	238
Measles		114		1,077	597	111	76	245	30	2,250
Meningitis, meningococcus				2	1			1	3	7
Mumps		20	10	225	202	95	12	51	72	687
Poliomyelitis				1		1				2
Scarlet fever		7	2	79	265	75	24	84	80	616
Tuberculosis (all forms)		2	6	182	54	17	13	26	45	345
Typhoid and paratyphoid fever				13	2					15
Undulant fever				3					2	5
Whooping cough		12		102	62	10	2		18	206

CUBA

Provinces—Notifiable diseases—4 weeks ended February 26, 1944.—During the 4 weeks ended February 26, 1944, cases of certain notifiable diseases were reported in the Provinces of Cuba as follows:

Disease	Pinar del Rio	Habana [1]	Matanzas	Santa Clara	Camaguey	Oriente	Total
Cancer	1		5	3		5	14
Chickenpox	1		2			3	6
Diphtheria		39	1			4	44
Hookworm disease		17					17
Leprosy				1		1	2
Malaria	30	8	6	10	4	386	444
Measles	5	46	11			1	63
Poliomyelitis				1		1	2
Scarlet fever		2					2
Trachoma						20	20
Tuberculosis	12	18	19	13	3	42	107
Typhoid fever	15	62	1	27	7	14	126
Whooping cough		41					41
Yaws				6		1	7

[1] Includes the city of Habana.

GERMANY

Infectious diseases—Week ended January 1, 1944, and period January 1 to December 25, 1943—Comparative.—The following numbers of cases of certain infectious diseases were reported in Germany [1] for the week ended January 1, 1944, and for the period January 1 to December 25, 1943, compared with the same period of 1942:

Disease	Week ended Jan. 1, 1944	January 1-December 25, 1943	Corresponding period, 1942
Anthrax	1	31	33
Cerebrospinal meningitis	36	2,514	2,732
Diphtheria	6,991	286,137	274,479
Dysentery	46	7,325	15,072
Inflammation of the brain	12	557	419
Malaria	1	682	709
Poliomyelitis	23	2,925	3,911
Psittacosis		16	4
Ptomaine poisoning	27	1,575	1,930
Scarlet fever	6,892	380,542	396,554
Trachoma	42	6,130	8,514
Tuberculosis (all forms)	1,867	141,304	144,495
Typhoid fever	226	18,355	16,021
Typhus fever	42	5,016	5,913
Undulant fever	9	165	199
Weil's disease	3	218	100
Whooping cough	980	128,415	85,996

[1] Although not stated in the report, it is assumed that the figures are for the old German Reich.

JAMAICA

Notifiable diseases—4 weeks ended March 11, 1944.—During the 4 weeks ended March 11, 1944, cases of certain notifiable diseases were reported in Kingston, Jamaica, and in the island outside of Kingston, as follows:

Disease	Kingston	Other localities	Disease	Kingston	Other localities
Cerebrospinal meningitis		1	Leprosy		5
Chickenpox	17	28	Tuberculosis	33	67
Diphtheria	3	3	Typhoid fever	7	93
Erysipelas	1	1			

NEW ZEALAND

Notifiable diseases—4 weeks ended February 28, 1944.—During the 4 weeks ended February 28, 1944, certain notifiable diseases were reported in New Zealand as follows:

Disease	Cases	Deaths	Disease	Cases	Deaths
Cerebrospinal meningitis	21	4	Poliomyelitis	8	
Diphtheria	66		Puerperal fever	5	
Dysentery (bacillary)	35	1	Scarlet fever	246	1
Erysipelas	24		Trachoma	3	
Food poisoning	5		Tuberculosis (all forms)	221	50
Influenza	1		Typhoid fever	11	2
Lead poisoning	1		Undulant fever	5	

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

NOTE.—Except in cases of unusual incidence, only those places are included which had not previously reported any of the above-mentioned diseases, except yellow fever, during the current year. All reports of yellow fever are published currently.

A table showing the accumulated figures for these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.

(Few reports are available from the invaded countries of Europe and other nations in war zones.)

Smallpox

British East Africa.—Smallpox has been reported in British East Africa as follows: Tanganyika Territory—weeks ended January 29, 1944, 45 cases; February 5, 60 cases; February 12, 35 cases. Uganda—weeks ended February 12, 129 cases; February 19, 83 cases; February 26, 101 cases.

Egypt.—Smallpox has been reported in Egypt as follows: Alexandria—weeks ended February 19, 1944, 65 cases, 9 deaths; February 26, 70 cases, 6 deaths. Port Said—weeks ended March 4, 140 cases, 9 deaths; March 11, 76 cases, 5 deaths.

French Guinea.—For the period January 11 to February 10, 1944, 130 cases of smallpox were reported in French Guinea.

India.—For the week ended February 26, 1944, 282 cases of smallpox with 81 deaths were reported in Bombay, and for the week ended March 4, 1944, 278 cases of smallpox with 224 deaths were reported in Calcutta, India.

Indochina.—For the period February 1–10, 1944, 95 cases of smallpox were reported in Indochina.

Nigeria.—Smallpox has been reported in Nigeria as follows: Weeks ended February 19, 1944, 148 cases with 36 deaths; February 26, 1944, 236 cases with 36 deaths.

Typhus Fever

Guatemala.—For the month of February 1944, 162 cases of typhus fever with 41 deaths were reported in Guatemala.

Rumania.—For the period March 1–15, 1944, 1,068 cases of typhus fever were reported in Rumania.

Slovakia.—For the period February 1–12, 1944, 33 cases of typhus fever were reported in Slovakia.

COURT DECISION ON PUBLIC HEALTH

Town water supply—order of State department of public health regarding chlorinating equipment upheld.—(Massachusetts Supreme Judicial Court; *Commonwealth* v. *Town of Hudson et al.*, 52 N.E.2d 566; decided December 29, 1943.) A Massachusetts law enacted in January 1942 provided as follows: "If the department of public health determines that, during the existence of the present state of war, it is necessary for a city, town, district, or water company maintaining a water supply to provide equipment for such supply, including treatment equipment, or additions to existing equipment, for the protection of the public health, said department may order such city, town, district, or company to provide such equipment or to make such additions to any existing equipment. The supreme judicial or the superior court shall have jurisdiction in equity to enforce any such order." The State department of public health sent a notice dated April 10, 1942, to the defendant town signed "By order of the department of public health. Paul J. Jakmauh, M. D., Commissioner of Public Health." This notice stated that "the department hereby determines that it is necessary for the town of Hudson to provide treatment equipment for chlorinating all water supplied to the town during the existence of the present state of war," and under the authority of the above-quoted statute ordered the town "to provide such chlorinating equipment forthwith." At a special town meeting held on April 29, 1942, it was voted "not to authorize the commissioners of public works to install chlorinating equipment for the town's water supply as ordered by the State department of public health." In October 1942 the Commonwealth, by the Attorney General, brought a bill in equity against the town, its commissioners of public works, and its selectmen, praying that they "be ordered forthwith to provide treatment equipment for chlorinating the water supplied to the town of Hudson, as ordered by the department of public health."

The water supply of the defendant town came from a well-isolated pond situated in a wooded section of another town. The water had never been treated, it satisfied State and Federal standards for drinking water, and was rated as very good. Several industrial plants in the town were engaged in producing goods needed for the war and a large number of their employees lived in the town. The pond was guarded constantly by one armed guard and two dogs. The State department's determination was based wholly upon the danger of pollution by "sabotage." The trial court reserved the case for the State supreme court without decision.

The latter court held the order to be within the authority given the department by the statute. According to the court it was unnecessary to give the town an option to purify the water in some other way.

The department had authority to specify even more particularly than it did the kind and amount of equipment to be provided. The fact that the evil to be avoided was one feared rather than one presently existing was no reason for denying legislative authority to guard against it. Also the fact that chlorination would cost the town money was not a constitutional objection to a legislative act requiring that precaution.

Concerning the question of delegation of legislative power the supreme court stated that the fact that the legislature, instead of requiring chlorination by its own act, left the selection of the water systems requiring such treatment to the department did not give rise to any constitutional objection. It was pointed out that one of the exceptions to or qualifications of the doctrine that the general power to legislate cannot be delegated was that the legislature could delegate to a board or an individual officer the working out of the details of a policy adopted by the legislature. The order in the instant case was stated by the court to be plainly a valid exercise of the State's police power. Even though made by the department it was made under a valid delegation of power by the legislature and had the same force as though made by the legislature itself.

With respect to giving the town a hearing the court held that there was no constitutional need therefor. The legislature was dealing with an emergency affecting many water systems throughout the State and a hearing by the department in each case would delay needed action and tend to defeat the statute's purpose.

That the town's water was naturally pure was said by the court to be beside the point. The department reasonably could find that the guard placed over the water supply could not insure against pollution by disease-producing organisms introduced by enemy agents or sympathizers and that chlorination would reduce the danger to public health if such pollution took place. The department's action was of the very kind contemplated by the statute and the problem was the State's business and not that of the defendant town alone. "An epidemic originating in Hudson might sweep the Commonwealth. The town cannot ask the courts to try the legislative question whether chlorination is needed. [Case cited.] Still less has it the right to nullify the order because not convinced of its necessity. There was never any sufficient reason for the town to doubt the validity of the order or to refuse to obey it."

A decree in accordance with the opinion was ordered entered by the supreme court.

FEDERAL SECURITY AGENCY

UNITED STATES PUBLIC HEALTH SERVICE

THOMAS PARRAN, *Surgeon General*

DIVISION OF PUBLIC HEALTH METHODS

G. ST. J. PERROTT, *Chief of Division*

The PUBLIC HEALTH REPORTS, first published in 1878 under authority of an act of Congress of April 29 of that year, is issued weekly by the United States Public Health Service through the Division of Public Health Methods, pursuant to the following authority of law: United States Code, title 42, sections 7, 30, 93; title 44, section 220.

It contains (1) current information regarding the prevalence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

The PUBLIC HEALTH REPORTS is published primarily for distribution, in accordance with the law, to health officers, members of boards or departments of health, and other persons directly or indirectly engaged in public health work. Articles of special interest are issued as reprints or as supplements, in which forms they are made available for more economical and general distribution.

Requests for and communications regarding the PUBLIC HEALTH REPORTS, reprints, or supplements should be addressed to the Surgeon General, United States Public Health Service, Washington 25, D. C. Subscribers should remit direct to the Superintendent of Documents, Washington, D. C.

Librarians and others should preserve their copies for binding, as the Public Health Service is unable to supply the general demand for bound copies. Indexes will be supplied upon request.

UNITED STATES GOVERNMENT PRINTING OFFICE WASHINGTON : 1944

For sale by the Superintendent of Documents, Washington 25, D. C.

Price 5 cents Subscription price $2.50 a year

Public Health Reports

VOLUME 59 APRIL 14, 1944 NUMBER 15

IN THIS ISSUE

Combinations of Types for Polyvalent Antiserums

CONTENTS

Public Health Reports

Vol. 59 • APRIL 14, 1944 • *No. 15*

CROSS REACTIONS BETWEEN THE SEVERAL PNEUMOCOCCIC TYPES AND THEIR SIGNIFICANCE IN THE PREPARATION OF POLYVALENT ANTISERUM[1]

By BERNICE E. EDDY, *Bacteriologist, United States Public Health Service*

In discussing 68 pneumococcic types, Mørch (*1*) stated that it would be impractical to produce antiserums for all types. She advocated the production of polyvalent antiserums for therapeutic and diagnostic use by immunization with mixed vaccines composed of pneumococci belonging to the groups which she described.

The preparation and distribution of the 32 types of antiserums now on the market involves much time and effort, some of which might be eliminated if certain types were combined. However, consideration must be given to the production and standardization of polyvalent antiserums, and to the prevalence and severity of the infections due to the pneumococci used for the preparation of these antiserums.

Björneboe (*2*), studying type 7 and three types related to 7, demonstrated that the homologous type antiserum gave the greatest protection in mice while antiserums prepared from related types exerted less and varying protection depending upon the components of the antigen used. Also, Björneboe (*3*) reported that rabbits were able to produce antibodies against two and three pneumococcic types at the same rate and in the same amount as against one type. When four or five types were used, less antibodies were produced, and against six and eight types considerably less antibodies resulted. The specific types used were not given and no statement was made concerning whether the types were immunologically related. Potent antiserum may be made for two antigenically different types. There has been on the market in this country for many years bivalent antipneumococcic horse serum for types 1 and 2, and in more recent years for types 4 and 8, and 5 and 7.

It has been shown previously (*4*) that there are all degrees of cross reactions among the pneumococcic types. Some cross reactions are so weak that they are shown only by highly potent concentrated antiserums. Others are so strong that an antiserum prepared with one

[1] From the Division of Biologics Control, National Institute of Health.

type of pneumococcus is effective for one or more related types. Between the two extremes are many types showing different degrees of cross reaction.

For the selection of types for the preparation of polyvalent antiserums, information on the interrelationship and incidence of the pneumococcic types is important. To make polyvalent diagnostic antiserums specific with the fewest possible absorptions not only should types be chosen which cross regularly but there should be some similarities in the cross reactions with other heterologous types. For types which are very closely related, such as types 6 and 26, it is doubtful if any advantage would accrue if animals were immunized with pneumococci of both types. Type 6 antiserums are also effective for type 26. Also, the production and standardization of a polyvalent antiserum for types like 7, 48, and 50 might involve time and labor out of all proportion to its worth. Type 7 is a frequent causative agent of severe infections, while types 48 and 50, at present, appear to be rare types of questionable importance.

Many different type combinations are possible. A study of cross reactions given by antiserums of different types and potencies, and reports of type incidence among many pneumococcic infections *(5, 6, 7)* are the basis for the present discussion of type combination for the preparation of polyvalent antiserums.

The methods for carrying out the tests for cross reactions (*8*), the source of the cultures and antiserums (*4*), and the terminology for the types (*9*) are described elsewhere. Subtypes or other names of strains which have been reported in the literature are given in parentheses after the type numbers in all the tables. Comparisons of the related pneumococcic types are shown in the tables; all of the cross reactions found in antiserums of the different types are shown in table 5 of the preceding paper (*4*).

Group 1. Types 1, 2, 5, 6, 7, 26, and 51. Group 2. Types 3, 4, 8, 14, 19, and 57.—The pneumococci in these two groups are combined principally because of the frequency of their occurrence (*5*) although there are cross reactions among some of them. Only by actual trial can it be determined if potent polyvalent therapeutic antiserums for the two groups can be prepared. If polyvalent antiserums cannot be made for all the types in the groups, it is possible that antiserums could be made for some of the types in each group—for instance, for types 1 and 2 and for types 5, 6, 7, 26, and 51 in group 1 and for types 3, 8, 19, and 57 and for types 4 and 14 in group 2. As has been shown (*4*) immunization with pneumococci of types 26, 51, and 57 would be unnecessary. Type 6 antiserums react almost equally well with pneumococci of types 6 and 26, type 7 antiserums with types 7 and 51, and type 19 antiserums with types 19 and 57.

Groups 1 and 2 diagnostic antiserums could be made which would

make possible the typing of a great percentage of pneumococci by examining them with two, instead of the present six, diagnostic group antiserums. Pneumococci not falling in one of the two groups could be identified by testing them with antiserums for the remaining groups.

Group 3. Types 9, 33, 49, and 68 (see table 1).—Types related to 9 have been the subject of considerable study. In 1939 Vammen (*10*)

TABLE 1.—*Cross reactions of heterologous type antiserums with pneumococci, types 9, 33, 49, and 68*

Antiserums			Capsular swelling titers for types—				
Use	Type	Lot	Homologous	9 (9N)	49 (9L)	33 (9A)	68 (9V?)
Therapeutic	1	101	1:128+	0	0	T	T
Do	5	501	1:128	P	0	0	0
Do	8	807	1:64+	0	0	T	T
Do	9	901	1:128+	1:128+	1:128	1:8+	1:8+
Diagnostic	9	906	1:32+	1:32+	1:32	0	0
Do	9	[1] 909	1:16+	1:16+	1:16+	<1:4	<1:4
Therapeutic	11	1106	1:128	P	P	0	0
Do	15	1501	1:128	0	0	P	0
Do	16	1603	1:128+	T	T	0	0
Do	18	1802	1:128+	T	0	0	0
Do	19	1901	1:128+	T	T	0	0
Do	33	3301	1:128+	1:4	1:8+	1:128+	1:128
Do	33	3302	1:64	<1:4	<1:4	1:64	1:32+
Diagnostic	33	[2] 3304	1:32	0	0	1:32	1:16+
Do	33	[3] 3306	1:32+	0	1:4+	1:32+	1:32
Do	33	[3] 3307	1:32	0	1:4+	1:32	----------
Do	33	[2] 3309	1:32+	0	0	1:32+	----------
Experimental	44	([4])	1:16	T	T	0	0
Do	53	([4])	1:16	0	0	T	0

[1] Antiserum not absorbed with type 33 pneumococci.
[2] Antiserum absorbed with type 49 pneumococci.
[3] Antiserum absorbed with type 9 pneumococci.
[4] Unabsorbed antiserums prepared at the New York City Laboratories.

The figures state the capsular swelling titers of the antiserums. "P" indicates that undiluted antiserum caused capsular swelling but that less than 90 percent of the organisms had capsules with distinct outlines, "T" that there was perceptible swelling but none of the pneumococci had capsules with distinct outlines, and "0" that no capsular swelling occurred.

described three serologic variants, types 9L, 9N, and 9V, of which the first two correspond to types 49 and 9, respectively. The next year, in 1940, Walter and her associates (*11*) reported on type 33 as being immunologically related to type 9. Mørch (*1*), investigating this type, found it to be closely related to 9V and renamed it type 9A. A known culture of the type 9V pneumococcus was not included in this study but the pneumococcus type 68 is closely related to type 33 and it is possibly the same as 9V. Types 9 and 49 as well as types 33 and 68 are much alike and the two groups are related to each other. It is possible that an antiserum can be prepared and standardized with types 9 and 33 which will be effective for all four types.

Group 4. Types 10, 34, and 69, and types 13 and 21 (see table 2).—Types 10 and 34 exhibit strong cross reactions and type 34 antiserums react regularly with type 69. Of the three types of pneumococci, type 69 shows capsular swelling with more heterologous type antiserums than type 10 or 34. It is possible that an effective antiserum

can be prepared for the three types although whether type 69 is prevalent enough to warrant its inclusion in the group must await further study.

It will further reduce the number of antiserums on the market if types 13 and 21 can also be included in the group with types 10, 34,

TABLE 2.—*Cross reactions of heterologous type antiserums with pneumococci, types 10, 13, 21, 34, and 69*

Antiserums			Capsular swelling titers for types—					
Use	Type	Lot	Homologous	10	34 (10A)	69 (39)	13	21
Therapeutic	6	602	1:128+	0	0	T	0	0
Do	7	704	1:128+	0	0	P	0	0
Do	7	705	1:64+	T	0	0	0	0
Do	10	1001	1:128	1:128	1:16+	P	<1;4	0
Diagnostic	10	1007	1:16	1:16	0	0	0	-------
Therapeutic	13	1301	1·256	<1:4	0	T	1:256	0
Do	14	1406	1:128	0	0	T	0	0
Do	15	1501	1:128	0	0	T	0	0
Do	16	1605	1:128	0	0	0	0	T
Do	17	1701	1:128	0	0	0	T	0
Do	19	1901	1:128	0	0	T	<1:4	0
Do	20	2002	1:128+	1:4	0	T	P	0
Do	21	2102	1:128	0	P	1:8	0	1:128
Diagnostic	21	2106	1:32+	-------	T	<1:4	-------	1:32+
Therapeutic	22	2201	1:128+	0	0	T	0	P
Do	24	2401	1:128	0	0	0	0	P
Do	25	2501	1:128	0	P	T	0	T
Do	27	2701	1:128	0	0	T	0	0
Do	29	2901	1:128	T	T	1:8	P	0
Do	33	3301	1:128+	0	0	T	0	0
Do	34	3402	1:64+	1:16+	1:64+	1:16+	0	T
Diagnostic	34	3404	1:16+	0	1:16+	1:8+	-------	-------
Do	34	3407	1:16+	0	1:16+	P	0	0
Experimental	41	(1)	1:8+	0	T	0	0	0
Do	52	5202	1:16+	T	0	0	0	T
Do	62	(2)	1:32	T	0	T	0	0
Do	66	(2)	1:32+	T	0	T	0	0
Do	70	(2)	1:16+	P	P	0	0	0
Do	74	(2)	1:16	0	0	0	P	0
Do	75	(2)	1:32+	0	0	<1:4	0	0

[1] Diagnostic antiserum prepared at Lederle Laboratories, Inc.
[2] Unabsorbed antiserum prepared at the New York City Laboratories.

and 69. Like types 10 and 34, they are relatively unimportant types. Types 10 and 13 exhibit some of the same serological reactions and type 21 antiserums show strong cross reactions with type 69 and weak reactions with type 34.

Group 5. Types 11, 43, and 53, and types 16, 28, and 72 (see table 3).—Antiserums for either type 11 or 43 are effective for both types and both show cross reactions with type 53. In addition, pneumococci of the three types exhibit swollen capsules with some of the same heterologous type antiserums. Information on type 53 as a cause of disease is lacking but it is antigenically related to the two more well-known types.

Also crossing with type 43 is type 16 and, in turn, type 16 is related to types 28 and 72. Commercial monovalent antiserums now are prepared for types 16 and 28 but because of cross reactions between these two types, they could likely be combined for the production of a

bivalent antiserum. It is possible that they could also be combined with type 72 and with types 11 or 43 and 53.

TABLE 3.—*Cross reactions of heterologous type antiserums with pneumococci, types 11, 16, 28, 43, 53, and 72*

Antiserums			Capsular swelling titers for types—						
Use	Type	Lot	Homologous	11	43 (11A)	53 (11B?)	16	28	72 (T)
Therapeutic	6	604	1:64+	1:4+	0	T	0	P	T
Do	7	703	1:128+	T	T	T	0	T	0
Do	9	904	1:128+	P	P	0	P	0	0
Do	11	1102	1:128	1:128	1:128	1:8+	T	T	0
Diagnostic	11	1109	1:16	1:16	1:16	<1:4	0	....	....
Therapeutic	15	1501	1:128	1:4	1:8	0	0	0	0
Diagnostic	15	1506	1:32	0	0	....	....	....	....
Therapeutic	16	1601	1:128+	0	1:4+	<1:4	1:128+	1:4	P
Diagnostic	16	1608	1:32	0	<1:4	P	1:32	0	T
Therapeutic	18	1802	1:128+	0	P	P	P	0	T
Do	20	2003	1:128	P	<1:4	T	0	0	0
Do	23	2301	1:128	0	0	0	0	T	0
Do	24	2402	1:128	0	0	0	0	T	0
Do	25	2501	1:128	0	0	0	0	T	0
Do	28	2801	1:128	0	0	0	1:8+	1:128	0
Do	33	3301	1:128+	0	T	P	0	0	0
Experimental	43	(1)	1:32+	1:16+	1:32+	1:4+	<1:4	0	0
Do	44	(2)	1:16+	0	T	T	T	0	T
Do	52	5204	1:64+	T	<1:4	0	0	0	0
Diagnostic	53	(3)	1:16	1:4+	T	1:16	0	0	0
Experimental	64	(2)	1:32	0	0	0	0	<1:4	0
Do	72	(2)	1:8+	0	T	T	P	0	1:8+
Do	73	(2)	1:8	0	0	0	0	T	0

[1] Diagnostic antiserum prepared at Lederle Laboratories, Inc.
[2] Unabsorbed antiserum prepared at the New York City Laboratories.
[3] Submitted for release as a type 11 antiserum.

Group 6. Types 12, 25, and 71 (see table 4).—Types 12 and 25 are similar in their clinical manifestations of disease in that a large percentage of the cases of pneumonia due to these types have been reported to have positive blood cultures (*7*). The two types are not related antigenically and, moreover, they are among the most specific of the pneumococcic types. Highly potent types 12 and 25 antiserums give few cross reactions, and few heterologous antiserums cause capsular swelling with either type. The only cross reaction shown regularly was by type 25 antiserums for type 71. Kauffmann (*12*) noted cross reactions between types 10 and 71. None of the type 10 antiserums employed in this study caused capsular swelling

TABLE 4.—*Cross reactions of heterologous type antiserums with pneumococci, types 12, 25, and 71*

Antiserums			Capsular swelling titers for types—			
Use	Type	Lot	Homologous	12	25	71 (26) (38)
Therapeutic	5	501	1:128	T	0	0
Do	12	1201	1:128	1:128	0	0
Do	25	2501	1:128	0	1:128	P
Diagnostic	25	2504	1:32	....	1:32	P
Do	25	2506	1:32	....	1:32	T

TABLE 5.—*Cross reactions of heterologous type antiserums with pneumococci, types 15, 18, 23, 30, 44, 46, 54, 55, 56, and 64*

Antiserums[3]			Capsular swelling titers for types—											
Use	Type	Lot	Homologous	15	30 (15A)	54 (15B)	18	44 (18A)	55 (18B)	56 (18C)	23	46 (23A)	64 (23B)
Therapeutic	3	304	1:32	0	0	0	0	0	0	T	0	0	0
Do	4	401	1:128+	0	T	T	0	0	0	0	0	0	0
Do	6	603	1:64+	T	T	T	0	0	0	T	0	0	0
Do	7	704	1:128+	0	T	T	P	T	T	P	0	0	0
Do	8	804	1:64+	0	T	T	T	T	T	T	T	0	0
Do	9	901	1:128+	0	0	0	0	P	0	0	0	0	0
Do	11	1102	1:128	T	0	0	T	T	T	T	0	0	0
Do	13	1301	1:256	0	0	0	P	0	0	P	0	0	0
Do	14	1401	1:128+	T	P	1:4	0	0	0	0	0	0	0
Do	15	1501	1:128	1:128	1:32+	1:128	0	T	0	0	0	1:4+	0
Diagnostic	15	1507	1:16+	1:16+	1:4+	1:8+		0				<1:4	
Do	15	1510	1:32+	1:32+	1:8+	1:32		T				T	
Therapeutic	16	1601	1:128+	0	T	0	P	P	P	P	0	0	0
Do	17	1703	1:16+	T	T	0	T	P	0	T	0	T	0
Do	18	1805	1:128	0	0	0	1:128	1:16	1:16	1:128	P	0	T
Diagnostic	18	1817	1:16				1:16	1:4	1:4	1:16	0	0	0
Do	18	[1] 1818	1:16+				1:16+	0	P	1:16+	0		0
Therapeutic	19	1901	1:128+	0	0	0	0	T	T	T	0	0	0
Do	20	2001	1:128	T	T	<1:4	0	0	0	0	0	T	T
Do	21	2101	1:128	0	T	T	0	0	0	0	0	0	0
Do	23	2302	1:128+	T	T	P	<1:4	<1:4	<1:4	<1:4	1:128+	1:32	1:16+
Diagnostic	23	2305	1:32		0	T	0	0	0	0	1:32	<1:4	<1:4
Therapeutic	27	2701	1:128	0	P	0	0	0	0	0	0	0	0
Do	28	2801	1:128	0	T	0	T	0	0	0	0	T	1:8+
Diagnostic	28	2805	1:16										<1:4
Therapeutic	29	2901	1:128	P	T	T	0	0	0	0	0	0	T
Do	31	3102	1:32+	T	T	0	0	0	0	0	0	0	0
Do	32	3201	1:128	0	0	0	0	0	0	0	P	T	0
Do	33	3301	1:128+	T	0	0	0	T	0	0	P	0	0
Experimental	44	(2)	1:8+	0	0	0	0	1:8+	T	0	0	0	0
Do	44	(3)	1:16+	T	0	0	1:4+	1:16+	1:8+	1:4+	0	0	0
Do	62	(3)	1:32+	0	T	0	0	0	0	0	0	0	0
Do	64	(3)	1:32	0	0	0	0	0	0	T	0	0	1:32
Do	72	(3)	1.8+	0	0	0	0	0	T	T	0	0	0

[1] Antiserum absorbed with type 44 pneumococci.
[2] Diagnostic antiserum prepared at Lederle Laboratories, Inc.
[3] Unabsorbed antiserums prepared at the New York City Laboratories.

of the type 71 pneumococcus. Unlike many of the types above 34 the culture of type 71 tested was highly virulent for mice. Its role as a causative agent of disease in man is unknown, but if it were to be combined with any other types for the production of antiserum, the most logical would seem to be with types 12 and 25.

Group 7. Types 15, 30, and 54; types 18, 44, 55, and 56; and types 23, 46, and 64 (see table 5).—Types 15, 18, and 23 are representatives of three groups of pneumococci which show relatively weak cross reactions but which are of about equal importance as causes of bronchopneumonia (*5*) and pneumonias in infants and children (*7*). An effective polyvalent antiserum for the three groups would be of use for a large number of cases of the same general prognosis.

Types 15 and 54 are closely related and have been discussed elsewhere (*4*). Type 15 antiserums also show strong cross reactions with type 30 so that the inclusion of the latter with type 15 or 54 for the production of an antiserum should insure an antiserum useful for all three types.

Types 18 and 56 are similar and type 18 antiserums give titers as high for type 56 as for the homologous type 18. There are strong cross reactions with types 44 and 55, and some of the same heterologous type antiserums cause capsular swelling of pneumococci of all four types. Because of these antigenic similarities it would be logical to group type 18 or 56 with types 44 and/or 55 for the production of a polyvalent antiserum. However, the prevalence and importance of types 44 and 55 as causes of disease should be taken into account.

Type 23 antiserums regularly exhibit strong cross reactions with types 46 and 64. Antiserums for the two latter types could possibly be prepared in combination for type 23 although type 46 is also antigenically related to type 15 and type 64 to type 28.

Type 15 antiserums give cross reactions with types 44 and 46, type 18 antiserums with types 23 and 64, and type 23 antiserums with types 15, 18, 30, 44, 54, 55, and 56. There are also antigenic components in common with additional types. However, these latter types differ from types 15, 18, or 23 either in prevalence or in cross reactions with other heterologous types.

Group 8. Types 17, 22, and 63 (see table 6).—No cross reactions between types 17 and 22 were observed but antiserums for both types regularly show cross reactions with type 63. Types 22 and 63 are closely related and antiserums for type 22 yield titers for type 63 which are almost as high as for the homologous type 22. Since antiserums are prepared commercially for both types 17 and 22, it is possible that a bivalent antiserum for types 17 and 22 or 63 could be made more economically.

TABLE 6.—*Cross reactions of heterologous type antiserums with pneumococci, types 17, 22, and 63*

Antiserums			Capsular swelling titers for types—			
Use	Type	Lot	Homologous	17	22	63 (22A)
Therapeutic	10	1001	1:128	T	0	0
Do	11	1104	1:128	P	0	0
Do	13	1301	1:256	T	0	0
Do	14	1401	1:128+	P	T	0
Do	15	1504	1:32	<1:4	0	0
Do	17	1701	1:128	1:128	0	1:8+
Diagnostic	17	1704	1:32	1:32	0	<1:4
Therapeutic	22	2201	1:128+	0	1:128+	1:128
Diagnostic	22	2206	1:16+	---------	1:16+	1:8+
Therapeutic	23	2302	1:128+	0	P	T
Do	24	2401	1:128	0	P	T
Do	29	2901	1:128	0	1:4	<1:4
Do	31	3102	1:32+	0	P	<1:4
Diagnostic	31	3109	1·4+	---------	0	T
Do	31	3114	1:8+	---------	0	P

Group 9. Types 20, 31, 40, 47, 61, and 62; types 29 and 66; and types 35 and 52 (see table 7).—Pneumococci of these types have more complicated antigenic structure than any of the other types thus far studied. They show strong cross reactions with each other and with many other types as well. Type 20 therapeutic antiserums yield titers for types 40, 47, 61, and 62 that are one-half or more the titers for the homologous type 20 and each gives a strong cross reaction with type 31. Also, type 31 therapeutic antiserums show strong cross reactions with types 20, 40, 47, 61, and 62. However, diagnostic antiserums for either type 20 or 31 yield very low titers for any of the related types, in no instance higher than 1:4. A possible explanation for this is that absorption of cross reactions from diagnostic types 20 and 31 antiserums with some heterologous type of pneumococcus removes most of the antibodies for these organisms. How many of the six types of pneumococci are necessary to produce an antiserum effective for all of the types for both therapeutic and diagnostic use must await actual trial though it is possible that types 20 and 31 will suffice.

Types 29 and 66 are closely related and antiserums for type 29 regularly show titers for type 66 that are almost as high as for the homologous type. Of the two types, 66 appears to have broader antigenic components. One type 66 antiserum produced capsular swelling titers for six of nine heterologous types in these groups that were from one-fourth to one-half the titer for type 66. Forster and his coworkers (*13*) noted a type 66 antiserum that was highly effective in protecting mice against a type 29 culture and in less degree against pneumococci of types 10 and 20. Type 66 pneumococci are reacted upon by more heterologous type antiserums than type 29, and some of these antiserums also manifest cross reactions with type 20 and its closely related types and with types 35 and 52.

TABLE 7.—*Cross reactions of heterologous type antiserums with pneumococci, types 20, 29, 31, 35, 40, 47, 52, 61, 62, and 66*

Antiserums			Capsular swelling titers for types—										
Use	Type	Lot	Homologous	20	31	40	47 (35A)	61 (42?) (Weingart)	62	29	66 (35B) (Hoge)	35	52 (Odd)
Therapeutic	2	201	1:256	P	0	0	0	0	0	0	0	0	0
Do.	5	501	1:128	0	0	0	0	T	T	0	T	0	0
Do.	6	602	1:128+	P	P	P	T	T	T	0	0	0	T
Do.	6	604	1:64+	0	0	0	0	0	0	T	T	P	P
Do.	10	1001	1:128	1:4+	0	0	1:4	1:4+	1:4+	<1:4	1:4+	1:4+	1:4+
Diagnostic	10	1004	1:16+	0			<1:4	<1:4		0	<1:4	<1:4	<1:4
Do.	10	1008	1:16+	0				<1:4	<1:4	T	<1:4		P
Therapeutic	11	1102	1:128	0	0	0	T	T	T	0	0	0	P
Do.	13	1301	1:256	<1:4	0	0	0	T	T	T	<1:4	0	0
Do.	15	1501	1:128	T	0	0	T	P	P	0	T	0	T
Do.	17	1701	1:128	0	0	0	0	0	0	0	T	0	0
Do.	18	1801	1:128	0	0	0	0	P	0	0	T	0	T
Do.	19	1903	1:128+	T	<1:4	T	T	T	P	0	0	0	0
Do.	20	2001	1:128	1:128	1:32	1:64+	1:64	1:64	1:64	0	1:4+	<1:4	<1:4
Diagnostic	20	2008	1:16+	1:16+	0	P	P	<1:4	<1:4	0	<1:4	T	T
Therapeutic	21	2101	1:128	0	0	0	0	0	T	T	<1.4	T	0
Do.	21	2102	1:128	0	0	0	0	0	T	0	0	0	P
Do.	22	2201	1:128+	0	1:8	0	0	0	0	0	0	0	0
Do.	23	2301	1:128	0	0	0	T	0	T	0	0	0	0
Do.	29	2901	1:128	0	0	0	1:8	T	T	1:128	1:64+	1:4	1:4
Diagnostic	29	2905	1:32				<1:4	T	P	1:32	1:16+	P	P
Therapeutic	31	3101	1:128	1:32+	1:128	1:32+	1:32+	1:32+	1:32+	0	0	0	<1:4
Diagnostic	31	3104	1:16+	0	1:16+	T	<1:4	<1:4	<1:4				T
Therapeutic	32	3202	1:128+	0	<1:4	P	0	T	P	0	0	0	0
Do.	34	3401	1:64	0	0	0	0	0	0	T	0	P	T
Experimental	41	(1)	1:8+	0	0	0	0	0	0	0	T	<1:4	<1:4
Do.	44	(2)	1:16	0	0	0	0	<1:4	0	0	0	0	0
Do.	52	5202	1:16+	0	0	T	<1:4	1:8	1:8	0	1:8	1:8+	1:16+
Do.	62	(2)	1:32+	<1.4	<1:4	<1:4	1:32+	1:32	1:32+	0	1:16+	1:4+	1:8
Do.	64	(2)	1:32	0	0	0	0	0	0	P	P	0	0
Do.	66	(2)	1:32+	0	0	T	1:16	1:16	1:16	1:16	1:32+	1:8+	1:8+
Do.	70	(2)	1:16+	0	0	1:8	<1:4	0	P	0	P	0	T
Do.	73	(2)	1:8	0	0	T	0	0	0	0	0	0	0
Do.	75	(2)	1:32+	0	0	0	0	0	0	0	0	0	T

[1] Diagnostic antiserum prepared at Lederle Laboratories, Inc.
[2] Unabsorbed antiserum prepared at the New York City Laboratories.

Types 35 and 52 show many serologic reactions in common, and pneumococci of the two types are reacted upon by many of the antiserums which cause capsular swelling of other organisms in the groups with types 20 and 29. From previous reports (*14, 15*) it appears that both types 35 and 52 are important as causes of disease. If pneumococci of one or both types can be combined with types 29 and 66 and with type 20 and/or any of the types closely related to 20 for the production of one antiserum, much laborious standardization of diagnostic monovalent antiserums will be eliminated and infections due to many types of pneumococci can be treated with a single polyvalent antiserum.

Group 10. Types 24, 45, 65; types 48 and 50; and types 58, 59, and 60 (*see table 8*).—With the exception of type 24, little information is

TABLE 8.—*Cross reactions of heterologous type antiserums with pneumococci, types 24, 45, 48, 50, 58, 59, 60, and 65*

Antiserums			Capsular swelling titers for types—								
Use	Type	Lot	Homologous	24	45 (24A) (40)	65 (24A)	48 (7B)	50 (7C)	58 (19B)	59 (19C)	60
Therapeutic	2	201	1:256	0	1:4	0	0	0	0	0	0
Do	6	604	1·61+	T	0	P	0	0	T	T	T
Do	7	701	1:128+	0	T	0	1:16	1:8+	T	T	0
Diagnostic	7	707	1:16+	--------	--------	--------	<1:4	<1:4	--------	--------	--------
Therapeutic	8	803	1:256	0	0	0	T	T	0	0	0
Do	8	804	1·64+	0	T	0	T	0	0	0	0
Do	9	904	1:128	0	0	0	0	0	T	T	0
Do	17	1701	1:128	0	0	0	0	0	T	T	1:8+
Do	19	1901	1:128	0	0	0	0	0	1:8+	1:8+	0
Diagnostic	19	1907	1:32	--------	--------	--------	--------	--------	<1:4	<1:4	--------
Therapeutic	20	2001	1:128	0	1:8	0	0	1:4+	0	0	0
Diagnostic	20	2010	1:16	--------	<1:4	--------	--------	<1:4	--------	--------	--------
Therapeutic	24	2401	1:128	1:128	1:16	1:32+	1:4+	1·8+	<1 4	1:4+	1:8+
Diagnostic	24	2406	1:16+	1:16+	1:4	1:8+	1:4	1:4+	<1 4	<1:4	P
Therapeutic	29	2901	1:128	0	0	0	T	0	0	0	0
Do	33	3301	1:128+	0	0	0	0	0	T	T	0
Experimental	59	(1)	1:16+	T	T	0	<1:4	<1:4	1:4+	1:16+	1:16
Do	66	(1)	1:32+	0	0	0	T	0	0	0	0

[1] Unabsorbed antiserums prepared at the New York City Laboratories.

available on the prevalence of any of the pneumococci in this group (*14*). Types 24 and 65 are much alike and type 24 antiserums yield titers for type 65 that are approximately one-half as high as the titers for the homologous type. They also regularly give cross reactions with type 45 and weaker cross reactions with types 48, 50, 58, 59, and 60. Antiserums for certain other types also cause capsular swelling of these pneumococci. For instance, type 7 antiserums evince cross reactions with types 48 and 50, type 17 antiserums with type 60, type 19 antiserums with types 58 and 59, type 20 antiserums with types 45 and 50, and one type 59 antiserum with types 24, 45, 48, 50, 58, and 60. Mørch (*1*) reported that type 45 (the Danish type 40) crossed with types 20, 24, 48, 50, 58, and 59. Types 48 and 50 have been classified as subtypes of 7 (*12*) and types 58 and 59 as subtypes

of 19 (*1*). However, based upon cross reactions, there is as much reason to group them tentatively with type 24 as with types 7 and 19.

Group 11. Types 27, 32, and 67 (see table 9).—Type 32 antiserums yield almost identical titers for the homologous types 32 and 67,

TABLE 9.—*Cross reactions of heterologous type antiserums with pneumococci, types 27, 32, and 67*

Antiserums			Capsular swelling titers for types—			
Use	Type	Lot	Homologous	27	32	67 (32A)
Therapeutic	7	702	1:256+	T	0	0
Do	15	1502	1:128	T	0	0
Do	17	1701	1:128	0	T	T
Do	19	1903	1:128+	0	T	T
Do	23	2302	1:128+	T	1:4	1:8
Do	27	2701	1:128	1:128	P	0
Diagnostic	27	2705	1:16+	1:16+	0	0
Therapeutic	32	3202	1:128+	0	1:128+	1:128+
Diagnostic	32	3205	1:32	----------	1:32	1:16+
Experimental	74	(1)	1:16	0	T	T

[1] Unabsorbed antiserum prepared at the New York City Laboratories.

and pneumococci of type 32 manifest capsular swelling with highly potent antiserum of type 27. Types 27 and 32 are among the least prevalent types for which commercial antiserums are manufactured and for this reason, more than because of their cross reactions, an antiserum for the combined types might be advisable.

Group 12. Types 36, 38, and 74 (see table 10).—Pneumococci of types 38 and 74 appear to be more closely related to each other than to type 36. However, type 36 pneumococci show capsular swelling

TABLE 10.—*Cross reactions of heterologous type antiserums with pneumococci, types 36, 38, and 74*

Antiserums			Capsular swelling titers for types—			
Use	Type	Lot	Homologous	36	38	74
Therapeutic	2	202	1:256	0	T	0
Do	5	505	1:128+	T	T	0
Do	6	604	1:64+	P	0	T
Do	7	703	1:128+	T	0	0
Do	9	904	1:128	P	T	0
Do	10	1001	1:128	T	0	0
Do	12	1202	1:128	T	T	0
Do	13	1302	1:64+	0	1:4	1:8
Do	15	1502	1:128	0	T	0
Do	20	2002	1:128+	T	0	0
Do	21	2102	1:128	0	T	0
Do	22	2201	1:128+	<1:4	<1:4	1:4
Diagnostic	22	2209	1:32+	0	P	<1:4
Therapeutic	23	2302	1:128+	T	T	<1:4
Diagnostic	23	2307	1:32+	0	0	P
Therapeutic	29	2901	1:128	<1:4	0	0
Do	32	3202	1:128+	0	T	P
Do	33	3301	1:128+	0	T	T
Experimental	52	5202	1:16+	0	P	0
Do	74	(1)	1:16	T	1:8	1:16

[1] Unabsorbed antiserum prepared at the New York City Laboratories.

TABLE 11.—*Cross reactions of heterologous type antiserums with pneumococci, types 39, 42, and 70*

Antiserums			Capsular swelling titers for types—			
Use	Type	Lot	Homologous	39 (33C)	42 (30) (33B)	70 (40A) (33)
Therapeutic	10	1001	1:128	0	T	0
Do	13	1301	1:256	0	0	P
Do	21	2101	1:128	<1:4	0	0
Do	29	2901	1:128	0	T	0
Diagnostic	42	4201	1:32	<1:4	1:32	1:4+
Experimental	52	5202	1:16+	0	0	T
Do	64	(1)	1:32	T	0	0
Do	66	(1)	1:32	0	0	P
Do	70	(1)	1:16+	<1:4	<1:4	1:16+
Do	73	(1)	1:8	0	0	T

[1] Unabsorbed antiserum prepared at the New York City Laboratories

with many of the heterologous type antiserums which give cross reactions with type 38 or 74. A polyvalent antiserum probably can be made for all three types.

Group 13. Types 39, 42, and 70 (see table 11).—These types were described by Mørch (*1*) as belonging to group 33. The fourth type in group 33 was the present type 40, which in this study appears to be closely related to type 20. Antiserums for types 1 to 34, inclusive, did not show strong cross reactions with any of the three types nor did a single heterologous type antiserum react with all of them. However, one antiserum each for types 42 and 70 yielded relatively strong cross reactions for each of the remaining two types and it appears likely that they can be combined for the production of a polyvalent antiserum.

Remaining unrelated types.—Of the pneumococci included in this study there are only four types, 37, 41, 73, and 75, which show few serologic reactions or characteristics in common with other types. It is not known whether these types are prevalent enough to justify the manufacture of antiserums. If they are, they might be combined in a new group, or possibly they can be combined with some of the previously described groups. Type 37 showed no capsular swelling with any of the heterologous type antiserums and it might be grouped with types 27, 32, and 67 since none of the latter types cross with many heterologous types.

Type 41 shows slight cross reactions with types 33 and 34 and if included in any group it might be with types 9 and 33. Type 73 gives a very slight cross reaction with type 12 and it is more virulent for mice than many of the higher types of pneumococci. It would appear logical to group it with types 12, 25, and 71. There are slight cross reactions between type 75 and types 34, 69, and 32, but the three latter types are more closely related to a number of other types. Further study of this type with potent antiserums of the newer types

may reveal relationships to other types. If not, it might be included in the group with types 36, 38, and 74, or with types 39, 42, and 70.

A résumé of the pneumococcic types comprising the different groups is shown in table 12.

TABLE 12.—*Résumé of the tentative grouping of pneumococcic types*

Group	Types included in the group	Types of antigens necessary to produce antiserum for the group	Types which may be disregarded	Remarks
1	1, 2, 5, 6, 7, 26, 51	1, 2, 5, 6, 7	26, 51	
2	3, 4, 8, 14, 19, 57	3, 4, 8, 14, 19	57	
3	9, 33, 49, 68	9, 33	49, 68	
4	10, 13, 21, 34, 69	10, 13, 21, 34 and/or 69	Possibly 34 or 69	Further study is required. There is a strong cross between 34 and 69.
5	11, 16, 28, 43, 53, 72	11 or 43, 16, 28, 53, 72	11 or 43	Types 53 and 72 could be omitted from the group.[1]
6	12, 25, 71	12, 25, 71	None	Type 71 could be omitted from the group.[1]
7	15, 18, 23, 30, 44, 46, 54, 55, 56, 64	15 or 54, 18 or 56, 23, 30, 44 and/or 55, 46, 64	15 or 54, 18 or 56, possibly 44 or 55.	Types 44, 46, 55, and 64 could be omitted from the group.[1]
8	17, 22, 63	17, 22	63	
9	20, 29, 31, 35, 40, 47, 52, 61, 62, 66.	20, 29 or 66, 31, 35 and/or 52	29 or 66, possibly also 35 or 52, and 40, 47, 61, 62.	Further study is required. Types 20 and 31 antiserums show cross reactions for 40, 47, 61, and 62 which are too strong to be absorbed easily
10	24, 45, 48, 50, 58, 59, 60, 65.	24 or 65, 45, 48 and/or 50, 58 and/or 59, 60	24 or 65, possibly also 48 or 50, 58, 59 or 60.	Types 45, 48, 50, 58, 59, and 60 could be omitted from the group.[1]
11	27, 32, 67	27, 32	67	
12	36, 38, 74	36, 38 and/or 74	Possibly 38 or 74	
13	39, 42, 70	39, 42, 70	None	
14	37, 41, 73, 75	37, 41, 73, 75	None	This is a miscellaneous group. Type 37 could also be included in group 11, type 41 in group 3, type 73 in group 6, and type 75 in group 12 or 13.

[1] If omitted, diagnostic antiserum for the group would have to have cross reactions for these types removed.

DISCUSSION

This study of cross reactions among the pneumococcic types has confirmed in many instances the relationship of different types as noted by other investigators (*1*, *10*, *12*, *14*, *15*, *16*). Since particular attention has been given to the extent or degree of cross reactions and to the epidemiology of the related types, changes have been suggested in the types making up some of the groups.

It is reported that pneumococci differ in the immune response they evoke in animals (*17*). For this reason, all groups must be regarded as tentative until it is ascertained by practice that the types used as

immunogens stimulate the production of antibodies sufficient to meet the minimum requirements for satisfactory antiserums. Less change in the established group mixtures of diagnostic antiserums would be necessary if polyvalent therapeutic antiserums were produced first. Groups of types which prove satisfactory for the production of therapeutic antiserums could then be used for diagnostic antiserums. In order to reduce to a minimum the time and effort spent on the preparation of specific diagnostic antiserums or effective therapeutic antiserums, it must be emphasized that combinations of types cannot be made arbitrarily. Also, caution must be exercised in the use of the mouse protective tests to compare the effectiveness of an antiserum for different types. Closely related types often differ greatly in their power to kill mice and these differences must be taken into account.

SUMMARY

Tentative combinations of types of pneumococci for the production of polyvalent antiserums, based upon cross reactions and reports of type incidence, are discussed.

ACKNOWLEDGMENT

It is desired to acknowledge gratefully the advice and helpful criticism of Lt. Col. Elliott S. Robinson, of the Office of the Surgeon General, United States Army.

REFERENCES

(1) Mørch, E.: Further studies on the serology of the pneumococcus group. J. Immunol., 43: 177–202 (1942).
(2) Björneboe, M.: Über die Schutzwirkung verschiedener Antistoffkomponenten in Typ 7 Pneumokkenseren. Ztschr. f. Immunitätsforsch. u. exper. Therap., 99: 160–167 (1940).
(3) Björneboe, M.: Serumprotein und Antistoffprotein bei Immunisierung mit mehremen Antigenen. Ztschr. f. Immunitätsforsch. u. exper. Therap., 99: 245–256 (1941).
(4) Eddy, B. E.: A study of cross reactions among the pneumococcic types and their application to the identification of types. Pub. Health. Rep., 59: 451–468 (Apr. 7, 1944).
(5) Rumreich, A. S., Shaughnessy, H. J., Mulcahy, J. V., Willett, J. C., Kellogg, W. H., and Mitchell, W. C.: A Nation-wide study of the bacterial etiology of the pneumonias. Pub. Health Rep., 58: 121–135 (1943).
(6) Bullowa, J. G. M., and Wilcox, C.: Endemic pneumonia; pneumococcic types and their variations in incidence and mortality for adults and children. Arch. Int. Med., 59: 394–407 (1937).
(7) Finland, M.: Present status of higher types of antipneumococcus serums. J. Am. Med. Assoc., 120: 1294–1307 (1942).
(8) Eddy, B. E.: A study of pneumococcus typing serums for the purpose of standardizing a test for potency. Pub. Health Rep., 55: 347–361 (1940).
(9) Eddy, B. E.: Nomenclature for the pneumococcic types. Pub. Health Rep., 59: 449–451 (Apr. 7, 1944).
(10) Vammen, B.: Serological variants of pneumococcus types 9 and 10. J. Immunol., 37: 359–365 (1939).
(11) Walter, A., Blount, K. D., Beattie, M. W., and Cotler, H. Y.: A distinct type of pneumococcus immunologically related to type 9 (Cooper). J. Inf. Dis., 66: 181–183 (1940).
(12) Kauffmann, F., Mørch, E., and Schmith, K.: On the serology of the pneumococcus group. J. Immunol., 39: 397–426 (1940).

(13) Forster, G. F., Noblitt, E. H., and Gilman, E. N.: Monovalent and polyvalent sera in the treatment of pneumococcal infections. J. Immunol., 45: 205–215 (1942).
(14) Walter, A. W., Guevin, V. H., Beattie, M. W., Cotler, H. Y., and Bucca, H. B.: Extension of the separation of types among the pneumococci: Description of 17 types in addition to types 1 to 32 (Cooper) with recommendations for terminology of all types reported through 1940. J. Immunol., 41: 279–294 (1941).
(15) Chinn, A. L., and Eddy, B. E.: Report of a new type of pneumococcus which crosses with types X, XI, XX, XXIX, and XXXI antipneumococcic serums. Pub. Health Rep., 56: 62–75 (1941).
(16) Heffron, R.: Pneumonia, with Special Reference to Pneumococcus Lobar Pneumonia. Commonwealth Fund, New York, 1939.
(17) Kauffmann, F., Bjorneboe, M., and Vammen, B.: Uber die Herstellung und Bewertung von Kaninchen-Pneumokokken-Seren. Ztschr. f. Hyg. u. Infektionskr., 121: 36–58 (1938).

PREVALENCE OF COMMUNICABLE DISEASES IN THE UNITED STATES

February 27–March 25, 1944

The accompanying table summarizes the prevalence of nine important communicable diseases, based on weekly telegraphic reports from State health departments. The reports from each State for each week are published in the Public Health Reports under the section "Prevalence of disease." The table gives the number of cases of these diseases for the 4 weeks ended March 25, 1944, the number reported for the corresponding period in 1943, and the median number for the years 1939–43.

DISEASES ABOVE MEDIAN PREVALENCE

Measles.—The number of cases of measles dropped from approximately 142,000 during the preceding 4-week period to 130,483 during the 4 weeks ended March 25. The current incidence was, however, 1.5 times the median seasonal expectancy. Each section of the country contributed to the high incidence of this disease. The largest number of cases was reported from the East North Central region, but the increases in other sections of the country ranged from 1.1 times the median in the Pacific region to almost 3 times the median in the Middle Atlantic States.

Meningococcus meningitis.—The incidence of this disease continued at a relatively high level. For the 4 weeks ended March 25 there were 2,150 cases reported, as compared with 2,272 cases in 1943, but the 1939–43 median for this period was only 201 cases. The disease has been unusually prevalent in all sections of the country. States reporting a high incidence were New York (243 cases), California (158), Illinois (144), Pennsylvania (138), Michigan (120), Ohio (119), Missouri and Tennessee (99 each), and Virginia (98); more than one-half of the total cases occurred in these nine States

Number of reported cases of 9 communicable diseases in the United States during the 4-week period Feb. 27–Mar. 25, 1944, the number for the corresponding period in 1943 and the median number of cases reported for the corresponding period, 1939–43

Division	Diphtheria: Current period	Diphtheria: 1943	Diphtheria: 5-year median	Influenza [1]: Current period	Influenza [1]: 1943	Influenza [1]: 5-year median	Measles [2]: Current period	Measles [2]: 1943	Measles [2]: 5-year median
United States	936	957	1,075	16,532	17,615	32,019	130,483	87,789	86,495
New England	40	10	25	83	35	48	7,567	8,422	6,153
Middle Atlantic	95	140	178	95	110	245	21,783	25,237	7,552
East North Central	142	116	199	777	430	1,940	35,573	13,993	7,891
West North Central	117	79	80	396	183	518	13,665	7,699	6,092
South Atlantic	133	169	205	4,540	7,324	11,085	24,834	5,222	11,873
East South Central	75	88	105	1,609	1,213	2,777	3,863	6,189	1,898
West South Central	194	204	209	6,913	6,921	10,377	8,982	5,634	4,502
Mountain	36	52	71	1,566	949	1,257	5,131	6,924	3,501
Pacific	104	99	99	553	450	1,141	9,085	8,469	8,469
	Meningococcus meningitis: Current period	**Meningococcus meningitis: 1943**	**Meningococcus meningitis: 5-year median**	**Poliomyelitis: Current period**	**Poliomyelitis: 1943**	**Poliomyelitis: 5-year median**	**Scarlet fever: Current period**	**Scarlet fever: 1943**	**Scarlet fever: 5-year median**
United States	2,150	2,272	201	68	92	74	28,659	16,287	18,079
New England	147	281	12	4	6	1	2,424	2,631	1,406
Middle Atlantic	460	479	44	5	12	7	6,093	3,953	5,269
East North Central	457	199	25	5	9	11	7,590	4,203	5,420
West North Central	167	137	11	8	5	5	3,401	1,718	1,718
South Atlantic	347	464	43	3	10	10	2,959	1,082	1,031
East South Central	219	226	27	3	7	7	722	541	768
West South Central	124	166	19	12	17	10	570	414	414
Mountain	24	65	7	5	8	5	1,447	848	552
Pacific	205	255	15	23	18	13	3,453	897	897
	Smallpox: Current period	**Smallpox: 1943**	**Smallpox: 5-year median**	**Typhoid and paratyphoid fever: Current period**	**Typhoid and paratyphoid fever: 1943**	**Typhoid and paratyphoid fever: 5-year median**	**Whooping cough [2]: Current period**	**Whooping cough [2]: 1943**	**Whooping cough [2]: 5-year median**
United States	39	90	183	241	229	299	7,644	16,081	16,081
New England	0	0	0	8	6	11	717	1,445	1,465
Middle Atlantic	0	0	0	33	45	45	1,236	3,841	3,841
East North Central	6	38	58	32	31	32	1,293	3,383	3,383
West North Central	9	12	77	17	10	14	433	794	632
South Atlantic	2	14	8	54	59	66	1,570	1,972	1,972
East South Central	5	5	8	18	13	31	485	666	566
West South Central	13	16	39	50	34	47	787	1,982	907
Mountain	2	3	7	9	7	16	437	501	863
Pacific	2	2	15	20	24	26	686	1,497	1,497

[1] Mississippi and New York excluded; New York City included.
[2] Mississippi excluded.

which represented every section of the country except the West South Central and Mountain regions. The smallest increase (3.4 times the median) was in the Mountain section, and the largest increase (18.3 times the median) occurred in the East North Central region.

Scarlet fever.—There were 28,659 cases of scarlet fever reported for the current 4-week period. In 1943 there were 16,287 cases reported for the corresponding period, and the 1939–43 median was approximately 18,000 cases. An increase of this disease is normally expected at this season of the year, but the rate of increase during this period was somewhat higher than in preceding years, and the current incidence was the highest for this period in 7 years. Each section of the country except the East South Central contributed to the current excess of cases.

DISEASES BELOW MEDIAN PREVALENCE

Diphtheria.—The incidence of diphtheria was the lowest on record for this period, the number of reported cases (936) being slightly below the previous year, during which 957 cases were reported. The 1939–43 median for this period was 1,075 cases. The New England and West North Central regions each reported an excess of approximately 45 percent over the median seasonal expectancy; a slight increase over the median was also reported from the Pacific region, but in all other sections the incidence was comparatively low.

Influenza.—The number of cases of influenza reported for the 4 weeks ended March 25 was 16,532, as compared with 17,615 for the corresponding period in 1943, and a preceding 5-year median of 32,019 cases. The current incidence was somewhat above the normal seasonal expectancy in the New England and Mountain regions, but all other sections reported a relatively low incidence.

Poliomyelitis.—The number of cases (68) of poliomyelitis reported during the current 4-week period was about 30 percent below the number reported during the corresponding period in 1943, and 10 percent below the 1939-43 median for this period. In the West North Central and Pacific regions the numbers of cases were almost twice the median incidence in each region, and 4 cases in the New England region compared with a 1939-43 median of 1 case; in other regions the situation compared very favorably with the experience of preceding years.

Smallpox.—The incidence of smallpox reached a new low level for this season of the year. For the 4 weeks ended March 25 there were 39 cases reported as compared with 90 in 1943 and a median of 183 cases for the corresponding period in 1939-43. The situation was favorable in all sections of the country, the numbers of cases in the various regions either closely approximating the medians or falling considerably below them.

Typhoid and paratyphoid fever.—Due largely to a rather high incidence (30 cases) of typhoid fever in the State of Texas, the number of cases of these diseases for the country as a whole was about 10 percent above the incidence for the corresponding period in 1943. The total number of cases reported (241) was, however, only about 80 percent of the 1939-43 median for this period. In the New England, North Central, and West South Central regions the incidence stood at about the normal seasonal level, but other regions reported very significant reductions from the 1939-43 medians.

Whooping cough.—For the 4 weeks ended March 25 there were 7,644 cases of whooping cough reported, as compared with 16,081 cases during the corresponding period in 1943; the 1939-43 median was represented by the 1943 figure. In each section of the country the incidence

was below that of 1943, as well as considerably below the seasonal median level.

MORTALITY, ALL CAUSES

An average of 9,661 deaths from all causes per week was reported by 93 large cities of the United States during the 4 weeks ended March 25. The number of deaths reported for these cities was 2.2 percent more than the average for the corresponding weeks of the years 1940-43. By weeks, the number of deaths was higher than the average for the first week of the current period, and lower than the average in the second week, but in the third and fourth weeks the deaths were 1.6 and 2.8 more, respectively, than the average for the same weeks in the 3 preceding years. The largest excesses in the number of deaths were reported from cities in the East North Central and Pacific sections of the country, with minor increases in all other sections except the New England, Middle Atlantic, and West South Central regions. In the Middle Atlantic region the number of deaths stood at the level of the preceding 3-year average, and in the New England and West South Central regions the numbers of deaths were slightly below the average.

DEATHS DURING WEEK ENDED APRIL 1, 1944

[From the Weekly Mortality Index issued by the Bureau of the Census, Department of Commerce]

	Week ended Apr. 1, 1944	Corresponding week, 1943
Data for 92 large cities of the United States:		
Total deaths	9,476	9,995
Average for 3 prior years	9,139	
Total deaths, first 13 weeks of year	132,285	132,498
Deaths under 1 year of age	617	631
Average for 3 prior years	547	
Deaths under 1 year of age, first 13 weeks of year	8,205	9,355
Data from industrial insurance companies:		
Policies in force	66,384,840	65,472,549
Number of death claims	13,927	13,792
Death claims per 1,000 policies in force, annual rate	11.0	11.0
Death claims per 1,000 policies, first 13 weeks of year, annual rate	11.4	10.7

PREVALENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED APRIL 8, 1944

Summary

A total of 499 cases of meningococcus meningitis was reported for the current week, as compared with 523 last week, 550 for the next earlier week, 587 for the corresponding week last year, and 68 for the comparable 5-year (1939–43) median. Nine States reporting currently 18 or more cases each (last week's figures in parentheses) are as follows: *Increases*—Massachusetts 25 (16), Pennsylvania 38 (37), Illinois 30 (28), Virginia 18 (5), North Carolina 18 (3), Colorado 30 (12); *decreases*—New York 53 (63), New Jersey 22 (24), Ohio 24 (30) (corrected report). The cumulative total to date is 7,659, as compared with 6,432 for the same period last year and a 5-year median of 719.

The incidence of both measles and scarlet fever also declined—30,462 cases of measles and 7,298 cases of scarlet fever were reported as compared with 34,092 and 7,727, respectively, for the preceding week. However, the cumulative figures for these diseases are 47 percent and 50 percent, respectively, above the corresponding 5-year medians.

The current figures for diphtheria, influenza, poliomyelitis, typhoid fever, and whooping cough are below those for the preceding week and for the corresponding 5-year medians. The cumulative totals to date for all of these diseases except influenza are below the corresponding 5-year medians.

Cumulative figures to date for other diseases included in the following table (last year's figures for the corresponding period in parentheses) are as follows: Anthrax 16 (22), dysentery (all forms) 4,078 (3,797), infectious encephalitis 139 (155), leprosy 9 (7), Rocky Mountain spotted fever 4 (5), tularemia 139 (245), endemic typhus fever 528 (679).

A total of 9,268 deaths was recorded for the week in 92 large cities of the United States, as compared with 9,450 for the preceding week and a 3-year (1941–43) average of 9,019. The cumulative total to date is 141,181, as compared with 141,790 for the same period last year.

Telegraphic morbidity reports from State health officers for the week ended April 8, 1944, and comparison with corresponding week of 1943 and 5-year median

In these tables a zero indicates a definite report, while leaders imply that, although none was reported, may have occurred.

Division and State	Diphtheria			Influenza			Measles			Meningitis, meningococcus		
	Week ended— Apr. 8, 1944	Week ended— Apr. 10, 1943	Median 1939–43	Week ended— Apr. 8, 1944	Week ended— Apr. 10, 1943	Median 1939–43	Week ended— Apr. 8, 1944	Week ended— Apr. 10, 1943	Median 1939–43	Week ended— Apr. 8, 1944	Week ended— Apr. 10, 1943	Median 1939–43
NEW ENGLAND												
Maine	0	0	1	8	1	1	315	10	151	1	9	0
New Hampshire	0	0	0	0	0	-------	26	27	27	2	2	0
Vermont	0	0	0	3	0	-------	212	430	56	1	1	0
Massachusetts	6	1	2	0	0	-------	643	1,746	949	25	38	3
Rhode Island	0	0	0	17	1	-------	256	14	44	1	16	1
Connecticut	1	0	0	0	4	5	400	341	341	9	18	1
MIDDLE ATLANTIC												
New York	11	21	18	[1] 5	[1] 13	[1] 13	2,784	2,756	1,563	53	48	6
New Jersey	3	10	7	6	19	11	1,411	1,754	907	22	28	1
Pennsylvania	12	15	15	3	2	-------	860	2,041	1,068	38	39	7
EAST NORTH CENTRAL												
Ohio	0	9	9	11	13	13	1,611	925	376	24	8	0
Indiana	7	4	6	12	19	19	226	226	134	7	8	2
Illinois	1	19	22	18	12	16	932	1,391	753	30	17	2
Michigan [2]	3	5	5	3	34	21	848	1,370	409	28	14	1
Wisconsin	3	3	1	49	40	103	2,541	1,627	731	7	4	1
WEST NORTH CENTRAL												
Minnesota	3	1	2	2	2	2	941	141	160	4	1	0
Iowa	2	0	9	0	0	4	235	245	221	3	0	0
Missouri	3	0	5	7	2	4	314	623	268	26	33	1
North Dakota	0	0	0	0	11	11	77	120	33	1	2	1
South Dakota	0	1	1	0	0	1	19	66	16	2	0	0
Nebraska	3	2	3	1	7	1	146	392	173	1	0	0
Kansas	3	3	3	0	5	13	566	797	582	5	2	1
SOUTH ATLANTIC												
Delaware	1	0	0	0	0	-------	3	93	8	2	2	0
Maryland [2]	6	2	1	9	8	14	982	91	344	10	18	5
District of Columbia	0	0	1	0	0	3	155	57	134	0	7	0
Virginia	9	8	10	246	323	378	1,223	559	479	18	29	4
West Virginia	2	5	5	3	5	38	556	79	79	1	5	1
North Carolina	5	1	15	10	7	33	2,815	202	810	18	20	2
South Carolina	2	8	8	376	618	552	500	207	200	5	25	3
Georgia	0	3	4	15	52	164	177	224	194	5	7	1
Florida	3	2	5	2	33	11	196	69	160	6	6	0
EAST SOUTH CENTRAL												
Kentucky	3	4	6	3	4	13	112	455	146	6	12	1
Tennessee	5	0	5	57	61	96	252	398	129	12	13	2
Alabama	6	7	5	107	198	172	493	118	169	9	12	3
Mississippi [2]	2	0	4	0	0	-------	-------	-------	-------	7	15	2
WEST SOUTH CENTRAL												
Arkansas	4	1	3	76	42	134	361	169	149	6	0	1
Louisiana	5	0	5	10	16	16	247	170	151	12	15	1
Oklahoma	8	2	5	137	89	89	175	66	66	7	[3] 3	1
Texas	17	40	36	731	1,372	1,232	2,958	1,150	1,127	16	29	6
MOUNTAIN												
Montana	0	1	2	11	0	8	116	295	76	1	0	0
Idaho	0	3	1	2	0	-------	28	318	52	0	20	0
Wyoming	0	0	1	1	19	1	82	140	72	1	3	0
Colorado	7	14	12	16	38	35	293	1,082	298	30	6	0
New Mexico	0	1	2	0	2	2	46	22	50	1	0	0
Arizona	0	5	2	83	98	125	386	60	98	0	0	0
Utah [2]	0	0	0	2	13	26	50	239	239	0	1	0
Nevada	0	0	0	24	0	0	1	24	0	2	0	0
PACIFIC												
Washington	3	1	1	3	0	2	349	564	564	3	4	2
Oregon	2	1	1	31	12	16	123	452	404	2	14	0
California	33	16	16	48	74	151	2,920	1,032	1,032	29	38	2
Total	184	219	271	2,148	3,804	3,412	30,462	25,377	24,006	499	[3] 587	68
14 weeks	3,396	3,898	4,262	322,715	60,738	123,386	336,879	235,785	228,957	7,659	6,432	719

See footnotes at end of table.

Telegraphic morbidity reports from State health officers for the week ended April 8, 1944, and comparison with corresponding week of 1943 and 5-year median—Con.

Division and State	Poliomyelitis			Scarlet fever			Smallpox			Typhoid and paratyphoid fever [4]		
	Week ended—		Median 1939–43	Week ended—		Median 1939–43	Week ended—		Median 1939–43	Week ended—		Median 1939–43
	Apr. 8, 1944	Apr. 10, 1943		Apr. 8, 1944	Apr. 10, 1943		Apr. 8, 1944	Apr. 10, 1944		Apr. 8, 1944	Apr. 10, 1943	
NEW ENGLAND												
Maine	0	0	0	33	18	11	0	0	0	0	0	0
New Hampshire	1	0	0	7	2	3	0	0	0	0	0	0
Vermont	0	0	0	11	15	13	0	0	0	0	0	0
Massachusetts	0	0	0	475	619	220	0	0	0	0	1	1
Rhode Island	0	0	0	21	24	12	0	0	0	0	0	0
Connecticut	0	0	0	107	93	93	0	0	0	0	2	2
MIDDLE ATLANTIC												
New York	1	0	0	667	567	610	0	0	0	7	6	6
New Jersey	0	0	0	266	158	202	0	0	0	4	0	2
Pennsylvania	1	0	1	715	337	394	0	0	0	2	2	7
EAST NORTH CENTRAL												
Ohio	0	0	1	433	254	361	0	0	1	3	3	3
Indiana	1	0	0	257	68	161	0	0	2	1	0	0
Illinois	1	3	2	519	180	466	1	0	1	2	3	1
Michigan [3]	0	0	0	291	128	301	0	0	0	1	3	3
Wisconsin	1	0	0	482	343	154	1	1	1	0	0	1
WEST NORTH CENTRAL												
Minnesota	1	0	0	162	76	74	0	0	2	0	0	0
Iowa	0	1	0	222	41	42	6	1	2	0	0	1
Missouri	0	0	0	138	192	111	0	1	1	1	0	1
North Dakota	0	0	0	25	5	12	0	0	0	0	0	1
South Dakota	0	0	0	39	17	18	0	0	1	0	0	0
Nebraska	0	0	0	111	56	34	0	0	0	0	0	0
Kansas	0	0	0	119	62	62	0	0	0	0	0	0
SOUTH ATLANTIC												
Delaware	0	0	0	18	7	7	0	0	0	0	1	0
Maryland [3]	0	0	0	232	139	50	0	0	0	0	2	2
District of Columbia	0	0	0	149	26	17	0	0	0	0	0	0
Virginia	0	0	1	164	56	56	0	0	0	3	0	2
West Virginia	0	0	1	116	24	32	1	0	0	3	1	1
North Carolina	0	1	0	41	30	31	0	0	0	1	0	1
South Carolina	1	1	0	4	4	3	0	0	0	0	0	0
Georgia	0	1	0	7	10	10	0	0	0	3	5	2
Florida	0	0	1	9	11	7	0	0	0	1	3	5
EAST SOUTH CENTRAL												
Kentucky	0	1	0	88	43	89	0	0	0	4	1	3
Tennessee	0	0	1	51	35	68	1	4	0	3	2	2
Alabama	0	1	0	8	21	18	0	0	0	0	1	1
Mississippi [3]	1	1	1	6	5	6	1	0	0	1	0	1
WEST SOUTH CENTRAL												
Arkansas	0	0	0	7	6	6	0	6	1	0	0	1
Louisiana	1	0	0	9	8	8	0	0	0	2	4	3
Oklahoma	0	0	0	34	39	21	0	0	3	0	0	1
Texas	3	1	2	134	76	60	0	6	3	6	3	5
MOUNTAIN												
Montana	0	0	0	44	6	12	0	0	0	0	1	1
Idaho	0	1	1	43	61	17	0	0	0	0	0	0
Wyoming	0	0	0	24	60	16	0	0	0	0	0	0
Colorado	0	0	0	61	50	40	1	0	0	0	2	2
New Mexico	0	0	0	7	4	4	0	0	0	1	3	2
Arizona	0	0	0	14	20	7	0	0	0	3	1	0
Utah [3]	0	2	0	113	45	22	0	1	0	0	0	0
Nevada	0	0	0	7	3	0	0	0	0	0	0	0
PACIFIC												
Washington	0	0	0	379	25	37	0	0	2	0	0	1
Oregon	1	0	0	139	33	20	0	0	0	2	0	0
California	2	5	1	290	144	124	0	1	1	4	1	2
Total	16	19	23	7,298	4,246	4,355	12	21	34	58	51	77
14 weeks	311	359	358	84,112	55,284	55,893	174	371	639	1,012	748	1,065

See footnotes at end of table.

Telegraphic morbidity reports from State health officers for the week ended April 8, 1944, and comparison with corresponding week of 1943 and 5-year median—Con.

Division and State	Whooping cough			Week ended April 8, 1944								
	Week ended		Median 1939-43	Anthrax	Dysentery			Encephalitis, infectious	Leprosy	Rocky Mt. spotted fever	Tularemia	Typhus fever
	Apr. 8, 1944	Apr. 10, 1943			Amebic	Bacillary	Unspecified					
NEW ENGLAND												
Maine	0	35	35	0	0	0	0	0	0	0	0	0
New Hampshire	5	0	1	0	0	0	0	0	0	0	0	0
Vermont	19	65	40	0	0	0	0	0	0	0	0	0
Massachusetts	50	149	188	0	0	0	0	0	0	0	0	0
Rhode Island	3	45	45	0	0	0	0	0	0	0	0	0
Connecticut	29	47	72	0	0	1	0	0	0	0	0	0
MIDDLE ATLANTIC												
New York	137	373	401	0	2	5	0	1	0	0	0	0
New Jersey	47	202	202	1	0	0	0	0	0	0	0	0
Pennsylvania	92	289	270	2	1	1	0	0	0	0	1	0
EAST NORTH CENTRAL												
Ohio	46	155	155	0	0	0	0	0	0	0	0	0
Indiana	10	81	32	0	0	0	0	2	0	0	0	0
Illinois	31	139	148	0	0	0	0	1	0	0	0	0
Michigan [3]	69	216	176	0	0	0	0	0	0	0	0	0
Wisconsin	38	224	132	0	0	0	0	1	0	0	0	0
WEST NORTH CENTRAL												
Minnesota	9	93	45	0	1	0	0	0	0	0	0	0
Iowa	4	24	11	0	0	0	0	0	0	0	0	0
Missouri	18	39	33	0	0	0	0	0	0	0	0	0
North Dakota	9	17	16	0	0	0	0	0	0	0	0	0
South Dakota	5	1	2	0	0	0	0	0	0	0	0	0
Nebraska	7	13	8	0	0	0	0	0	0	0	0	0
Kansas	36	95	34	0	0	0	0	0	0	0	0	0
SOUTH ATLANTIC												
Delaware	3	3	6	0	0	0	0	0	0	0	0	0
Maryland [2]	44	111	93	0	0	0	1	0	0	0	0	0
District of Columbia	5	26	18	0	0	0	0	0	0	0	0	0
Virginia	79	77	58	0	0	0	17	0	0	0	0	0
West Virginia	24	42	42	0	0	0	0	0	0	0	0	0
North Carolina	178	189	189	0	0	0	0	0	0	0	0	2
South Carolina	69	46	55	0	0	1	0	0	0	0	0	1
Georgia	16	91	29	0	0	1	1	0	0	0	1	6
Florida	18	42	19	0	0	1	0	0	0	0	0	0
EAST SOUTH CENTRAL												
Kentucky	83	50	59	0	0	0	0	0	0	0	0	0
Tennessee	36	67	43	0	1	0	3	0	0	0	0	0
Alabama	119	52	23	0	0	0	0	0	0	0	0	4
Mississippi [2]	------	------	------	0	0	0	0	0	0	0	2	3
WEST SOUTH CENTRAL												
Arkansas	9	9	9	0	1	0	0	0	0	0	0	0
Louisiana	2	18	5	0	6	0	0	0	0	0	1	1
Oklahoma	10	45	10	0	0	0	0	0	0	0	0	0
Texas	172	697	284	0	1	205	0	0	0	0	0	7
MOUNTAIN												
Montana	3	11	11	0	0	0	0	0	0	0	0	0
Idaho	0	0	2	0	0	0	0	0	0	0	0	0
Wyoming	0	2	2	0	2	0	0	0	0	0	0	0
Colorado	0	19	60	0	0	0	0	0	0	0	0	0
New Mexico	4	7	26	0	0	0	0	0	0	0	0	0
Arizona	29	35	35	0	0	0	18	0	0	0	0	0
Utah [2]	39	46	46	1	0	0	0	0	0	0	0	0
Nevada	0	0	0	0	0	0	0	0	0	0	0	0
PACIFIC												
Washington	46	34	64	0	0	0	0	0	0	0	0	0
Oregon	20	19	19	0	0	0	0	0	0	0	0	0
California	75	416	372	0	0	6	0	1	0	0	0	0
Total	1,747	4,456	3,562	4	15	221	40	6	0	0	5	24
14 weeks	25,620	55,880	55,880	16	372	2,810	806	139	9	4	139	528
14 weeks, 1943	------	------	------	22	405	2,796	596	155	7	5	245	679

Alaska—Week ended April 8, 1944: influenza, 3; measles, 18; meningitis, 1; whooping cough, 1; pneumonia, 2; chickenpox, 7.

[1] New York City only. [2] Period ended earlier than Saturday.

[3] Exclusive of delayed report (included in cumulative total only) of 19 cases in Oklahoma.

[4] Including paratyphoid fever cases reported separately as follows: New York, 1; Michigan, 1; Virginia, 1;

WEEKLY REPORTS FROM CITIES

City reports for week ended March 25, 1944

This table lists the reports from 88 cities of more than 10,000 population distributed throughout the United States, and represents a cross section of the current urban incidence of the diseases included in the table.

	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
NEW ENGLAND												
Maine:												
Portland	0	0	------	0	12	1	1	0	18	0	0	0
New Hampshire:												
Concord	0	0	------	0	0	0	1	0	3	0	0	0
Vermont:												
Barre	0	0	------	0	0	0	0	0	0	0	0	0
Massachusetts:												
Boston	1	0	------	0	99	4	17	0	84	0	0	25
Fall River	0	0	------	0	14	0	0	0	1	0	0	0
Springfield	0	0	------	0	51	0	0	0	42	0	0	7
Worcester	0	0	------	0	0	0	8	0	62	0	0	0
Rhode Island:												
Providence	0	0	1	0	145	2	5	0	5	0	0	7
Connecticut:												
Bridgeport	0	0	------	0	38	1	1	0	3	0	0	0
Hartford	0	0	1	0	8	1	0	0	16	0	0	0
New Haven	0	0	------	0	132	1	1	0	4	0	0	1
MIDDLE ATLANTIC												
New York:												
Buffalo	0	0	------	0	3	0	12	0	34	0	0	0
New York	12	3	6	8	2071	38	84	0	345	0	2	35
Rochester	0	0	------	0	7	3	2	0	4	0	0	3
Syracuse	0	0	------	0	2	1	4	0	5	0	0	3
New Jersey:												
Camden	0	0	------	0	6	0	5	0	49	0	0	0
Newark	0	0	1	0	122	4	4	0	17	0	0	5
Trenton	0	0	5	0	8	2	1	0	11	0	0	0
Pennsylvania:												
Philadelphia	3	0	8	2	51	4	33	0	100	0	2	13
Pittsburgh	0	0	4	4	42	5	23	0	23	0	1	7
Reading	0	0	------	0	2	0	1	0	7	0	0	0
EAST NORTH CENTRAL												
Ohio:												
Cincinnati	1	0	------	1	67	10	6	0	52	0	0	1
Cleveland	0	0	1	0	352	14	9	0	111	0	0	2
Columbus	0	0	1	1	134	0	6	0	5	0	0	3
Indiana:												
Fort Wayne	0	0	------	0	3	0	5	0	7	0	1	0
Indianapolis	1	0	------	1	52	8	6	0	57	0	0	2
South Bend	0	0	------	0	5	0	0	0	7	0	0	0
Terre Haute	0	0	------	0	0	0	2	0	0	0	0	0
Illinois:												
Chicago	1	0	4	2	117	21	35	0	179	0	0	14
Springfield	0	0	------	0	59	0	3	0	4	0	0	2
Michigan:												
Detroit	5	0	5	1	109	16	18	0	168	0	1	13
Flint	0	0	------	0	8	0	1	0	1	0	0	2
Grand Rapids	0	0	------	0	151	1	0	0	15	0	0	0
Wisconsin:												
Kenosha	0	0	------	0	19	0	0	0	1	0	0	1
Milwaukee	3	0	1	1	144	4	5	0	90	0	0	19
Racine	0	0	------	0	3	0	0	0	2	0	0	1
Superior	0	0	------	0	0	0	2	0	30	0	0	0
WEST NORTH CENTRAL												
Minnesota:												
Duluth	0	0	------	0	19	1	2	0	24	0	0	3
Minneapolis	4	0	------	1	578	1	8	0	45	0	0	6
St. Paul	0	0	------	1	672	5	6	0	82	0	0	6
Missouri:												
Kansas City	1	0	------	1	44	6	10	0	56	0	0	0
St. Joseph	1	0	------	0	4	1	0	0	1	0	0	3
St. Louis	0	0	3	2	191	11	16	0	46	0	0	5

City reports for week ended March 25, 1944—Continued

	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
WEST NORTH CENTRAL—continued												
North Dakota:												
Fargo	0	0	------	0	8	0	0	0	7	0	0	0
Nebraska:												
Omaha	0	0	------	0	0	0	7	0	0	0	0	0
Kansas:												
Topeka	0	0	------	0	37	0	1	0	3	0	0	4
Wichita	0	0	1	0	152	0	2	0	5	0	2	1
SOUTH ATLANTIC												
Delaware:												
Wilmington	1	0	------	0	2	5	2	0	1	0	0	0
Maryland:												
Baltimore	8	0	3	3	871	3	13	0	99	0	0	20
Cumberland	0	1	0	0	0	0	0	0	0	0	0	0
Frederick	0	0	------	0	3	0	0	0	0	0	0	0
District of Columbia:												
Washington	2	0	3	0	153	2	13	0	155	0	0	2
Virginia:												
Lynchburg	0	0	------	0	7	1	0	0	2	0	0	1
Richmond	0	0	------	0	251	2	3	0	5	0	1	0
Roanoke	0	0	------	0	72	0	1	0	0	0	0	0
West Virginia:												
Charleston	0	0	------	0	3	0	0	0	17	0	1	0
Wheeling	0	0	------	0	23	0	1	0	22	0	0	0
North Carolina:												
Winston-Salem	0	0	------	0	31	0	2	0	3	0	0	0
South Carolina:												
Charleston	0	0	21	0	34	0	5	0	1	0	0	0
Georgia:												
Atlanta	1	0	3	0	51	3	1	0	9	0	0	1
Brunswick	0	0	------	0	0	1	1	0	0	0	0	0
Savannah	0	0	2	1	7	2	1	0	0	0	0	0
Florida:												
Tampa	1	0	------	0	21	3	3	0	2	0	0	0
EAST SOUTH CENTRAL												
Tennessee:												
Memphis	0	0	3	1	22	9	2	0	13	0	0	1
Nashville	0	0	------	0	7	1	8	0	6	0	0	1
Alabama:												
Birmingham	0	0	2	1	10	1	5	0	5	0	0	0
Mobile	0	0	------	0	3	0	1	0	0	0	0	0
WEST SOUTH CENTRAL												
Arkansas:												
Little Rock	0	0	1	0	38	0	3	0	0	0	0	0
Louisiana:												
New Orleans	0	0	5	1	24	1	5	0	7	0	7	[illegible]
Shreveport	0	0	------	0	0	0	8	0	1	0	0	[illegible]
Texas:												
Dallas	0	0	------	0	158	1	4	0	3	0	0	[illegible]
Galveston	0	0	------	0	1	0	1	0	0	0	0	[illegible]
Houston	2	0	------	1	46	1	8	0	1	0	0	[illegible]
San Antonio	1	0	2	3	15	0	9	1	2	0	0	[illegible]
MOUNTAIN												
Montana:												
Billings	0	0	------	0	5	0	0	0	1	0	0	[illegible]
Great Falls	0	0	------	0	13	1	0	0	7	0	0	[illegible]
Helena	0	0	------	0	1	0	0	0	12	0	0	[illegible]
Missoula	0	0	------	0	0	0	0	0	1	0	0	[illegible]
Idaho:												
Boise	0	0	------	0	5	1	0	0	6	0	0	[illegible]
Colorado:												
Denver	0	0	4	0	96	1	8	0	22	0	0	1[illegible]
Pueblo	0	0	------	0	16	0	2	0	3	0	0	[illegible]
Utah:												
Salt Lake City	0	0	------	0	4	1	2	0	26	0	0	

City reports for week ended March 25, 1944—Continued

	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
PACIFIC												
Washington:												
Seattle	0	0	------	0	51	1	9	1	63	0	0	2
Spokane	0	0	3	3	45	0	0	0	23	0	0	8
Tacoma	0	0	------	1	5	0	1	0	56	0	0	2
California:												
Los Angeles	4	0	24	1	288	3	9	0	47	0	0	2
Sacramento	0	0	1	1	28	0	1	0	1	0	0	11
San Francisco	0	0	5	0	70	7	6	0	38	0	0	5
Total	53	4	124	38	8,216	212	486	2	2,441	0	18	234
Corresponding week, 1943	68	1	131	42	7,252	199	545	3	1,681	0	7	1,186
Average, 1939–43	74	------	393	[1] 40	[2] 5,783	------	[1] 497	------	1,560	6	17	1,096

[1] 3-year average, 1941–43.
[2] 5-year median.

Dysentery, amebic.—Cases: New York, 1; Philadelphia, 10; Birmingham, 1; Mobile, 1; Los Angeles, 2; San Francisco, 2.

Dysentery, bacillary.—Cases: Providence, 2; New York, 3; Detroit, 1; Charleston, S. C., 8; Dallas, 1; Los Angeles, 12.

Dysentery, unspecified.—Cases: San Antonio, 5.

Typhus fever.—Cases: New York, 1; Tampa, 1; Houston, 1.

Rates (annual basis) per 100,000 population, by geographic groups, for the 88 cities in the preceding table (estimated population, 1942, 34,680,400)

	Diphtheria case rates	Encephalitis, infectious, case rates	Influenza		Measles case rates	Meningitis, meningococcus, case rates	Pneumonia death rates	Poliomyelitis case rates	Scarlet fever case rates	Smallpox case rates	Typhoid and paratyphoid fever case rates	Whooping cough case rates
			Case rates	Death rates								
New England	2.5	0.0	5.0	0 0	1243	24.9	84.7	0.0	593	0.0	0.0	100
Middle Atlantic	6.7	1.3	10 7	4.0	1035	25.5	75.6	0.0	266	0.0	2.2	30
East North Central	6 4	0.0	7.0	4.1	716	40 4	57.4	0.0	427	0.0	1.2	35
West North Central	11.8	0.0	7.8	9.8	3331	49.0	101.9	0.0	429	0.0	3.9	55
South Atlantic	22.6	1.7	55.7	7.0	2661	38.3	80.0	0.0	550	0.0	3.5	42
East South Central	0.0	0.0	29.8	11.9	250	65.5	95.3	0.0	143	0.0	0.0	12
West South Central	8 8	0.0	23.5	14.7	829	8.8	111.8	2.9	41	0.0	20.6	24
Mountain	0.0	0.0	32.2	0.0	1129	32.2	56.4	0.0	629	0.0	0.0	113
Pacific	7.0	0.0	57.8	10.5	853	19.3	45.6	1.8	400	0.0	0.0	44
Total	8.0	0.6	18.7	5.7	123.9	32.0	73.3	0.3	36.8	0.0	2.7	85

TERRITORIES AND POSSESSIONS

Hawaii Territory

Honolulu—Dengue fever.—During the period March 1–15, 1944, 12 cases of dengue fever were reported in Honolulu, T. H., bringing the total since the beginning of the outbreak last year to 1,446 cases.

Plague (rodent).—Plague-infected rodents (rats and mice) have been found in Hamakua District, Island of Hawaii, T. H., as follows: Honokaa—February 22, 1944, 2 rats, March 1, 1 rat; Kapulena—February 23, 1 rat, February 25, 1 rat; Kukuihaele—February 29, 1 rat; Paauhau—February 28, 2 mice, March 1, 1 mouse.

FOREIGN REPORTS

BRITISH GUIANA

Vital statistics—1942—Comparative.—The following table shows the numbers of births and deaths in the whole colony of British Guiana for the year 1942, as compared with the year 1941:

	1942		1941	
	Number	Rate per 1,000 population	Number	Rate per 1,000 population
Live births	13,835	38.2		35.4
Stillbirths	691	[1] 5.0		[1] 4.5
Deaths	6,233	17.2		15.6
Deaths under 1 year of age	1,340	[2] 97		[2] 84
Deaths from:				
Bronchitis and bronchopneumonia	528	1.5	495	1.4
Cancer	141		143	
Diphtheria	14		7	
Filariasis	31			
Heart diseases	441		429	
Hookworm disease	10		7	
Influenza	9			
Intestinal diseases	328		334	
Malaria	367		288	
Nephritis	497	1.4	485	1.4
Pneumonia	326	0.9	284	0.8
Puerperal fever	10		7	
Tetanus	14		9	
Tuberculosis (all forms)	232	0.64	238	0.67
Typhoid and paratyphoid fever	62		86	

[1] Per 100 live births.
[2] Per 1,000 registered births.

NOTE.—Population estimated as of Dec. 31, 1942, 361,754.

CANADA

Provinces—Communicable diseases—Week ended March 11, 1944.—During the week ended March 11, 1944, cases of certain communicable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox	5	22		206	352	71	55	98	159	968
Diphtheria		8	2	69	1	7			3	90
Dysentery (bacillary)				6						6
German measles		7		59	54	14	38	13	40	225
Influenza	1	4			33	3	4		22	67
Measles		90	2	865	667	169	94	203	42	2,132
Meningitis, meningococcus	1	3	1	2	9				2	18
Mumps	2	3		127	359	61	10	76	33	671
Poliomyelitis				4						4
Scarlet fever		28	8	96	198	54	18	57	78	537
Tuberculosis (all forms)		2	8	99	60	25	24	21	38	277
Typhoid and paratyphoid fever				14	1					15
Undulant fever				2	2					4
Whooping cough		6	2	66	68	10	11	2	37	202

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

NOTE.—Except in cases of unusual incidence, only those places are included which had not previously reported any of the above-mentioned diseases, except yellow fever, during the current year. All reports of yellow fever are published currently.

A table showing the accumulated figures for these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.

(Few reports are available from the invaded countries of Europe and other nations in war zones.)

Plague

Egypt—Ismailiya District.—During the week ended March 25, 1944, 16 deaths from plague have been unofficially reported in Ismailiya District, Egypt.

Indochina.—Plague has been reported in Indochina as follows: Cochinchina, February 1–10, 1944, 1 case; Laos, February 11–20, 1944, 1 case, February 21–29, 4 cases; Annam, February 21–29, 1944, 4 cases.

Smallpox

Algeria.—For the period February 21–29, 1944, 27 cases of smallpox were reported in Algeria.

Gambia.—During the week ended March 11, 1944, 13 cases of smallpox were reported in Gambia.

Great Britain—England—London.—During the week ended March 18, 1944, 4 cases of smallpox were reported in London. These cases were all contacts with previous cases.

India.—During the week ended March 4, 1944, 289 cases of smallpox with 102 deaths were reported in Bombay, and for the week ended March 11, 240 deaths from smallpox were reported in Calcutta, India.

Indochina.—For the period February 11–29, 1944, 388 cases of smallpox were reported in Indochina.

Ivory Coast.—For the period February 11–20, 1944, 57 cases of smallpox with 13 deaths were reported in Ivory Coast.

Mexico.—During the month of January 1944, 236 cases of smallpox were reported in Mexico. States reporting the highest numbers of cases were as follows: Coahuila, 48; Guerrero, 13; Mexico, 11; Puebla, 15; San Luis Potosi, 36; Tamaulipas, 23; Vera Cruz, 45; and Zacatecas, 17.

Sudan (French).—For the period February 11–20, 1944, 95 cases of smallpox with 7 deaths were reported in French Sudan.

Turkey.—During the month of January 1944, 1,661 cases of smallpox were reported in Turkey.

Typhus Fever

Algeria.—For the period February 21–29, 1944, 15 cases of typhus fever were reported in Algeria.

Bulgaria.—For the period January 20 to February 16, 1944, 213 cases of typhus fever were reported in Bulgaria.

Hungary.—During the week ended March 4, 1944, 66 cases of typhus fever were reported in Hungary, and for the week ended March 11, 75 cases were reported.

Mexico.—During the month of January 1944, 185 cases of typhus fever were reported in Mexico. States reporting the highest numbers of cases were as follows: Mexico, D. F., 43; Mexico State, 21; Michoacan, 12; Puebla, 39.

Rumania.—For the period March 16–23, 1944, 443 cases of typhus fever were reported in Rumania.

Slovakia.—During the week ended February 26, 1944, 14 cases of typhus fever were reported in Slovakia.

Turkey.—For the month of January 1944, 190 cases of typhus fever were reported in Turkey.

Union of South Africa—Cape Province.—For the period January 7 to February 19, 1944, 2,500 cases of typhus fever were reported in the Transkei region of Cape Province, Union of South Africa. For the week ended February 19, 1944, 378 cases were reported and for the week ended February 26, 429 cases of typhus fever were reported. With few exceptions all cases were among non-Europeans.

Yugoslavia.—For the period January 8–31, 1944, 273 cases of typhus fever were reported in Yugoslavia.

Yellow Fever

Belgian Congo—Stanleyville Province—Babeyru.—On February 17, 1944, 1 death from yellow fever was reported in Babeyru near Wamba in the northeastern section of Stanleyville Province, Belgian Congo.

×

FEDERAL SECURITY AGENCY

UNITED STATES PUBLIC HEALTH SERVICE

THOMAS PARRAN, *Surgeon General*

DIVISION OF PUBLIC HEALTH METHODS

G. ST. J. PERROTT, *Chief of Division*

The PUBLIC HEALTH REPORTS, first published in 1878 under authority of an act of Congress of April 29 of that year, is issued weekly by the United States Public Health Service through the Division of Public Health Methods, pursuant to the following authority of law: United States Code, title 42, sections 7, 30, 93; title 44, section 220.

It contains (1) current information regarding the prevalence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

The PUBLIC HEALTH REPORTS is published primarily for distribution, in accordance with the law, to health officers, members of boards or departments of health, and other persons directly or indirectly engaged in public health work. Articles of special interest are issued as reprints or as supplements, in which forms they are made available for more economical and general distribution.

Requests for and communications regarding the PUBLIC HEALTH REPORTS, reprints, or supplements should be addressed to the Surgeon General, United States Public Health Service, Washington, D. C. Subscribers should remit direct to the Superintendent of Documents, Washington 25, D. C.

Librarians and others should preserve their copies for binding, as the Public Health Service is unable to supply the general demand for bound copies. Indexes will be supplied upon request.

UNITED STATES GOVERNMENT PRINTING OFFICE, WASHINGTON : 1944

For sale by the Superintendent of Documents, Washington 25, D. C.

Price 5 cents. Subscription price $2.50 a year

Public Health Reports

VOLUME 59 APRIL 21, 1944 NUMBER 16

IN THIS ISSUE

Hospitals in the Public Health Panorama

Susceptibility of Hamsters to Leptospirosis

CONTENTS

Public Health Reports

Vol. 59 • APRIL 21, 1944 • *No. 16*

HOSPITALS IN THE PUBLIC HEALTH PANORAMA[1]

By WARREN F. DRAPER, *Deputy Surgeon General, United States Public Health Service*

The Western Hemisphere will face many grave responsibilities at the end of the war, but few will be more important than those concerned with public health. The new tasks that await us will require not only breadth of vision and technical skill but a social consciousness commensurate with the magnitude of health requirements in each country and throughout the world.

In discussing the future of public health, I think we would all agree with Sir Arthur MacNalty, formerly chief medical officer of the British Ministry of Health, that public health is "the science of preventive medicine in its broadest sense." If we would also agree that no sharp line can be drawn between prevention and cure, we must logically conclude that the panorama of public health presents an expanding universe in which are included all knowledge, skills, and activities that will conduce to the eradication of disease, the amelioration of suffering, and the preservation and promotion of health.

This does not mean that health officers would or should take over all these functions. They should, however, have a larger responsibility in pointing out the roads to health, and in clearing away such obstructions as economic barriers, ignorance, and official indifference which now all too often block the free flow of health services from those qualified to give them to those who need them. The health officer of the future must possess a clearer understanding of the social and economic factors affecting health; he should continue his professional training all through life in order to keep abreast of current scientific discoveries which may have a bearing on public health methods; and finally, in whatever capacity he serves, whether in a rural area or in a large city, whether as the head of a State or national health organization, he should vigorously promote the cause of health at all times for all people. However, enlarged social vision and greater technical

[1] Condensed from a paper presented at the First Regional Institute for Hospital Administrators, Mexico City, Mexico, January 28, 1944.

knowledge will be needed not only by the health officer of the future but by the practicing physician, the dentist, the nurse, the hospital administrator, the engineer, and all other health workers.

We in the United States are considering various ways in which to achieve a post-war reorientation and improvement of health activities. To do this will require the fullest cooperation of all groups concerned. Representatives of government, of the medical and allied professions, of health agencies, and of labor, management, and the public at large should come together for free and frank discussion of health needs and of the changes that will be necessary to meet them.

If health services, both preventive and curative, are to be distributed equitably to entire populations, there is need in each country for a comprehensive national health service organized in the public interest. There should be a central or Federal health agency responsible for all aspects of national health. This agency should be concerned with over-all planning, the coordination of health activities, the establishment of standards and broad policies, and the fostering of research. It should cooperate closely with the central health agencies of other nations in the interests of international health. Internally, it should provide technical assistance to smaller governmental units and should assume administrative responsibility for those functions which cannot be carried out by State and local health departments because of administrative difficulties or excessive costs. For the majority of health activities, experience has shown that local or regional rather than central administration is more satisfactory because of the benefits to be derived from local interest in planning, organizing, and carrying out programs.

The central health agency should assemble, analyze, and interpret statistical and other reports from State and local health agencies. It should conduct surveys in connection with health problems having more than local interest. It should provide the expert advice of engineers, architects, and hospital experts in working out national and regional plans for hospitals of various types and sizes. It should be on the alert for discoveries in clinical medicine, biochemistry, and physics, to the end that new knowledge may be made available for the benefit of the nation at large. I envisage the central health agency of the future as a great clearinghouse for health knowledge, both preventive and curative, national and international. In addition, it should engage in laboratory and clinical research on health problems of wide public interest, such as cancer, tuberculosis, mental diseases, dental caries, and upper respiratory infections. If, for instance, the incidence of dental caries could be cut in half, or even reduced by 30 or 40 percent, there would almost immediately be a great improvement in dental health, and the savings in expenditures for dental services would be a boon to the entire population. It seems not

unlikely that methods now being investigated could bring about such a reduction.

One great desideratum in public health at the present time is for more basic research into the causes, prevention, and cure of illness. It is possible that if central health agencies in many countries are charged by their governments with responsibility for research into the cause and prevention of cancer, mental disease, and the cardiovascular diseases, and if they are given the necessary funds and personnel to conduct such research, we may be in a position to report as much progress in the fight on these diseases by 1964 as we can now report in the fight on typhus, typhoid, and plague during the past 20 years.

Below the central or Federal level in the public health organization of the future, there will undoubtedly be a number of administrative levels—regional, State, health district, county, municipality, and small rural health unit. At each level there will need to be a reorganization into units of convenient administrative size.

The smallest administrative unit should have a health center, counterpart of the local elementary school, to house the health activities of that community. These centers would vary in size and in scope of services from place to place, depending on the social and economic characteristics of the locality, on the density of population, and on the nearness to general hospitals or polyclinic medical centers. A health center serving a remote rural community would probably have a health officer, a public health nurse, and such other staff members as were needed to handle matters of sanitation, inspection, vital statistics, and other traditional public health services. In addition, the health center of the future might contain one or two offices for the use of local physicians so that they would have access to the laboratory services which are now an absolute necessity in diagnosis and which the country doctor cannot afford to set up in his own home. The center might also include a few beds for maternity and emergency cases. Here, too, there might be a consultation room for visiting specialists from the large medical centers. If the community were too small to support or to need full-time special clinics, it might be possible to hold such clinics at reasonable intervals under the professional supervision of specialists from the larger official health departments. Mobile diagnostic equipment, such as X-ray machines, might be taken from State health departments to the small health centers for use in mass case-finding surveys.

In more densely populated communities, health centers might be established to serve larger groups of people. Thus, recent studies made by a committee of the American Public Health Association indicate that health districts of not less than 50,000 population might be established. In the United States 3,070 counties would be regrouped to form 1,127 local jurisdictions for health administration.

Wherever practicable, trading centers would serve as the nuclei for health districts organized to serve the population within a radius of 40 miles.

Without attempting to describe in greater detail the future administrative pattern and geographical distribution of health services, I think it is clear we must have better organization than we now have if we are to achieve a more even distribution of services.

When we come to the task of actually setting down on paper the master plans for national, regional, and local health activities, we begin to appreciate the role that hospitals are destined to play in the entire organizational scheme, for we must depend upon the hospitals not only for their present and enlarged professional services but also for their important role in education and research. The large teaching hospitals located in the great centers of population will occupy positions of primary importance. There is no more important task to be performed than that of training future health personnel. Teaching hospitals after this war will have an incomparable opportunity to help in the education of health workers.

Too long have doctors considered that the cure of the sick was their primary function; too long has the public thought of doctors as persons to be summoned only in the event of illness or accident. In the popular mind, and probably in the professional mind as well, hospitals have been thought of as the last resort for the patient at death's door, and in a large number of cases that has been the fact. The place of the general hospital in the public health services of the future will depend upon the type of training given in the teaching hospitals and in the medical schools.

There must unquestionably be a greater emphasis on research. Clinicians, teachers, and administrators should be ever on the alert to discover the medical student, the intern, or resident who shows an interest in, or ability for, research. The greatest encouragement should be given to such students. Financial assistance should be provided through scholarships, fellowships, and government subsidies. Recognition and education of a single Pasteur, Lister, or Curie might mean more for national and international health than the training of a thousand physicians to devote their lives to curing or trying to cure preventable illnesses.

The teaching hospital may also be expected to serve the region in which it is located by encouraging specialists on the staff to spend a certain number of days periodically in visiting the larger health centers in their region. Thus, the brain specialist at a teaching hospital in a city of one million population might periodically visit the main health centers in cities of 500,000 population. Such an arrangement would give the specialist an opportunity to see selected patients in cities of intermediate size, thus broadening his own ex-

perience, and at the same time affording the general practitioners in these cities the opportunity of discussing their more difficult cases with the visiting specialists. Once or twice a year institutes might be held under the joint auspices of the teaching hospitals and of local or district health centers.

When we turn from the teaching to the nonteaching general hospitals, we find the institutions which will share with local health departments many of the new responsibilities of the post-war era. Neither public health officials, hospital administrators, nor practicing physicians can turn deaf ears to popular demands for access to hospital and medical care, regardless of the ability of the individual to pay for the services. How these demands may best be met is not an easy matter to decide. It is not enough to provide government grants for medical care and hospitalization if there are not enough physicians or hospitals in the places where they are needed. It is not enough to build more hospitals if there are neither doctors, nurses, nor technicians to staff them and if there is no way to maintain the hospitals after they are built. Finally, it is not even enough to build, staff, and maintain a hospital unless that institution accomplishes something more than the daily care of the sick and injured. Unless the community hospital can point, over a period of years, to a reduction in the incidence of sickness and to an increase in the general health of the population, it will not have been fully effective.

The general hospital will unquestionably be expected to play a different role in community life and the same may be said of local health departments. Perhaps the happiest solution would be to bring the two institutions nearer together physically and let them constitute the community health center. General practitioners will perforce make greater use of institutional facilities whether these are located in a hospital or a health department. The average practitioner cannot afford to set up in his home the office equipment needed for modern diagnosis. Indeed, it would be a waste of time for a practicing physician to try to make the necessary laboratory tests even if he had the equipment at hand. More and more the physician is carrying on his profession in centrally located medical buildings, in voluntary group associations where several workers share equipment, office help, telephone service, and the like. There is much to commend the suggestion that physicians should go one step further and have their offices either in or near the health center.

In this connection, I should like to point out the wisdom of stimulating local, voluntary action. It may seem easier to force through sweeping reforms by Government fiat, but in so doing we may lose one of the forces most needed to bring about the desired reforms, namely, the spontaneous action of individuals and of groups. While

there is much indifference and lethargy to overcome, much can be accomplished through education stimulated and guided by public and voluntary health and welfare organizations. Usually, voluntary action does not go far enough and then it becomes necessary for the State to step in and complete the job. Perhaps in no other field of human endeavor is it more important to have the voluntary action of individuals singly and collectively. Neither physicians, health officers, nor nurses can be especially effective in promoting health if they count on what they can do in a half-hour visit at office, clinic, or home. Physical fitness is not produced when an acute illness is cured, nor is chronic disease abated by a 2-week stay in a hospital. While admittedly we must do all we can to cure acute illness and alleviate chronic disease, we must at the same time realize that it is within the bounds of possibility so to educate the next generation that much of this burden of illness will not develop.

The newer health education will call for participation by everyone in the community and for that reason I should like to see the retention, and stimulation, of voluntary action. It is well for people to desire to live wholesomely. It is well for them to know how to eat for health and to enjoy doing so. It is well for them to avoid living habits that predispose to painful diseases. Health education in the schools can play an extremely important part in this conditioning of children. Here again hospitals should help. Clinicians and surgeons, technicians, nurses, and administrators might come to recognize that part of their civic duty lay in devoting a little time each week to the children in the schools.

Health education should penetrate into places of work, and there again hospital staffs could be of inestimable service in cooperating with industrial hygiene divisions of health departments. Education of workers should go far beyond questions of industrial disease and accidents, for health cannot be divided into compartments by factory walls nor does it lend itself to the artificialities of statutory limitations. Adult health education of workers at their places of work through the combined efforts of health officials and hospital administrators should be part of every community health program.

The health program of the future will unquestionably be directed toward preventive activities on all fronts. It will require more trained personnel, more and different facilities. This will mean more money.

Questions of finance loom large whenever health programs are outlined. The practical politician, the seasoned health official, the harassed hospital administrator, and the doctor who cannot collect his bills will probably all agree that health services for everyone would be desirable. At the same time they will point out that the provision of such services is expensive and that many people simply do not have the means to pay for them. The necessity for government aid is

apparent, but how such aid is to be given is not clear. Health services are unique in that they are the only services needed by every individual from "womb to tomb." However they are provided, whoever pays for them, they are admitted requisites in modern society.

It is impossible to view the panorama of public health services the world over without concluding that the financing of such services will probably be accepted increasingly as a public responsibility. Each country will have to evolve its own financial scheme. Many countries have developed sickness insurance plans to provide limited medical care and hospitalization to certain classes of workers. Other countries, like the Soviet Union, Ireland, and New Zealand, have medical services which are provided to everyone through the public health agencies. Poland and China are planning such an approach after the war, and the Joint Parliamentary Committee on Social Security in Australia has proposed a comprehensive health service for the entire population to be financed from general revenues by an income tax.

Whatever we may do, it is of the utmost importance to preserve the best features of our present system of medical practice lest, in the zeal to reform, we ruthlessly destroy the good along with the bad. Progress must be made by building carefully on the foundations already developed.

We have conducted surveys throughout the United States to ascertain what would have to be done after the war to provide a Nationwide physical foundation for healthful living. A sanitary environment in cities, towns, and rural areas is the first requisite for a national health program. Many large cities are still not adequately provided with modern sanitation facilities. Preliminary estimates indicate that it would require an expenditure of about 300 million dollars a year for 10 years to meet these essential needs. Additional public water supplies, sewer systems, plants for the treatment of industrial wastes, and incinerators or other installations for garbage disposal are required for cities, while uncontaminated water supplies as well as sanitary privies are needed in rural areas. An expenditure of 3 billion dollars for sanitation would result in a further reduction in the incidence of water-borne and milk-borne diseases and a lessening of the burden on physicians and hospitals for the care of persons suffering from diseases which might long since have been wiped out had they been attacked with sufficient vigor. In addition, new precautions must be taken to guard our people from the spread of malaria and from outbreaks of typhus and plague. An expenditure of over 100 million dollars annually is estimated as necessary to carry on the several control programs to fight these scourges, which, in spite of all our knowledge, may seriously threaten the Western Hemisphere at war's end.

The second great need in the United States is for hospitals, health centers, and buildings to house local health departments. Here in the city which boasts the oldest hospital in the Americas and which is developing such a splendid group of general and special hospitals, it is hardly necessary to point out how essential such institutions are in implementing a health program designed to prevent as well as cure illness. In spite of the fact that there are over a million beds in more than 6,000 hospitals in our country, the distribution of beds in rural areas is still not satisfactory, due in large measure to economic conditions. Our present estimates indicate that if we are to build the numerous small health centers required in sparsely settled areas and are to construct the larger hospitals that should serve State and regional needs and, at the same time, are to replace obsolete structures, we shall need to spend some 200 million dollars a year for 10 years.

While many of our cities and wealthier States are financially able to build the health facilities they need, there are many communities which cannot do so. Those are the communities which have had long-standing shortages of all types of health and welfare services. They will require government aid both for construction and for maintenance of facilities.

If hospitals and health centers are built after the war with the aid of Federal funds, I hope it will be possible in most instances to staff and operate them with private practitioners of medicine in accordance with agreements to be worked out between them and the Federal Government. I believe that a very large proportion of our lay population as well as the majority of medical practitioners would prefer to see the continuation of the private practice of medicine wherever possible. This does not preclude the use of salaried physicians in areas where private practice is so unremunerative that no physician could be induced to settle. Nor does it preclude the employment of physicians on a part-time basis for a variety of services that cannot be paid for advantageously in any other way. In this connection, hospital leaders will probably have more to say about future methods of payment for medical services than any other group of health workers, for it will develve upon them to work out some scheme satisfactory to these institutions, the professions, and the publ'c.

In the United States, after we provide the physical facilities to serve as foci for the more equitable and adequate distribution of health services, we shall need to evolve methods for breaking down the economic barriers which now prevent low-income groups from having all the health services they need. There has been considerable agitation for the expansion of voluntary insurance schemes to aid in meeting some of the financial burdens imposed by catastrophic illness. Ten percent of our population is already covered by such insurance, and proposals have been made for the extension of these plans to a much

larger proportion of the people. While voluntary insurance furnishes an answer to only part of the problem in health economics, the Blue Cross plans and many schemes sponsored by labor and management, notably the Kaiser plan, are making significant contributions in this direction. It is too early to make any final pronouncement about the efficacy of voluntary insurance as it is being developed in the United States, but the movement has gained considerable headway and is worth encouraging.

But after all voluntary efforts have been made, even under the most favorable arrangements, the major problems of health will still remain. All levels of government, Federal, State, and local, in the United States will probably have to work together to finance those health activities that cannot be paid for by the localities or groups of people which are the direct beneficiaries. Thus, if a community is too poor to build a health center or pay for a health officer or physician, the State or the Federal Government, singly or jointly, may aid the community. Similarly, government funds will probably be used more generally to provide medical and hospital care for low-income groups, including recipients of public assistance and those with incomes so low that they cannot afford to purchase adequate medical care at present rates. An extension of public health services to include tax-supported medical care and hospitalization for low-income groups under arrangements to be worked out by representatives of hospitals, the professions, and the public might help to solve one of our most pressing health needs. Salaried physicians at health centers and hospitals might provide for this group which cannot pay for needed services and which the medical profession should not be expected to serve gratis as it now so frequently does.

In our country, we are hoping to raise the income level of the population by full employment and increased wages. But even when these desirable social reforms shall have been brought about, there will still remain persons who cannot work because of old age or physical or mental disability. Again I envisage the time when there will be available to the physically and mentally disabled the rehabilitation services which are needed to restore them to useful and happy ways of life. Greater emphasis on tax-supported preventive services for handicapped persons would reduce the number of those who would otherwise become permanent public charges. Ultimately, through the expansion of public health services to the entire population, the incidence of chronic disease should be reduced to a minimum. It is this load of chronic illness that bears down heavily in every country: It cannot be borne by insurance schemes and therefore tends to be neglected unless governmental agencies assume a large measure of responsibility for both prevention and cure.

In the United States, Federal aid would be desirable to provide refresher courses and postgraduate training for physicians returning from military duty. A continuing program of medical education or at least one lasting during the period of reconstruction would also seem desirable. Rather generous proposals along these lines are now being considered by the Congress. Perhaps satisfactory arrangements could be worked out for using the personnel thus aided to staff such health centers and general hospitals as may be constructed or maintained by government. A year or two of service in these hospitals and health centers would enlarge the experience and social viewpoint of the next generation of physicians and would at the same time tide them over a difficult period until they could establish themselves in private practice —if that were their ultimate goal. There are great opportunities for returning physicians, dentists, nurses, and technicians if we but plan wisely for their continuing education and for their distribution in new facilities properly equipped and maintained.

Finally, government funds should be used to insure educational programs which would encourage men and women of promise to reenter research on their return from the armed services. We spend pitifully small amounts on research, but I am hopeful that the impetus which has been given to scientific investigation under the pressure of war will carry over into peacetime and that we shall have institutes for the study of nutrition, mental disease, cancer, dental defects, tuberculosis, cardiovascular diseases, and other conditions which are responsible for the greater part of our present load of sickness and for four-fifths of the general death rate.

The distant view is obscured by clouds of war. Yet there is every reason to believe that an era of great achievement lies ahead. The New World has been spared the destruction that has laid much of the Old World in ruins. It is for us to point the way in the standards we set, in the type of physician we train, in the health programs we develop. We can accept half measures of reform, or we can assume the leadership in the war against disease. We can dissipate our energies in controversy over the vested interests of government, organized medicine, and voluntary hospitals, or we can come together as specialists in health problems to work together for the common good and for the cause of national and international health. The choice is ours!

EXPERIMENTAL LEPTOSPIROSIS IN HAMSTERS (*CRICETUS AURATUS*)[1]

By Carl L. Larson, *Passed Assistant Surgeon, United States Public Health Service*

A practical aspect of the study of leptospirosis involves the choice of suitable susceptible laboratory animals. In the instance of

[1] From the Division of Infectious Diseases, National Institute of Health.

Leptospira icterohaemorrhagiae numerous species of host are available, but no fully susceptible host is readily accessible for studies of *L. canicola*. The susceptibility of hamsters (*Cricetus auratus*) to infection with these spirochetes will be discussed in this paper.

Meyer, Stewart-Anderson, and Eddie (*1*) observed that very young guinea pigs are susceptible to infections with *L. canicola*, the features of the disease produced being a febrile reaction accompanied by weight loss. Death was rarely noted, but continued passage in these animals tended to increase the relative number of deaths. Walch-Sorgdrager (*2*) also pointed out that the reaction in guinea pigs due to infections with *L. canicola* was much milder than that due to infections with *L. icterohaemorrhagiae*. Hamsters were first investigated for their susceptibility to leptospirae by Morton (*3*) who discovered that *L. icterohaemorrhagiae* killed 3- to 5-week-old Syrian hamsters in 5 to 8 days with typical icterus. Using only a single strain of *L. canicola* he found that hamsters survived the injection of this agent although organisms could be detected in the blood stream. A discussion of the animals previously known to be susceptible to *L. icterohaemorrhagiae* can be found in another paper (*4*). Icterus, hemorrhages, and death are the common features of the disease produced in susceptible animals following inoculation with this organism.

MATERIAL AND METHODS

Hamsters (*C. auratus*) of varying ages were selected from the stock raised at the National Institute of Health. The ages ranged from 14 to 250 days. Swiss mice 3 to 4 weeks old and guinea pigs weighing about 150 gm. were also used.

Infective material consisted of organisms grown on Verwoort's medium at room temperature or at 32° C. or of 10 percent emulsions of liver and kidneys of animals infected with leptospirae. All injections were made by the intraperitoneal route with doses of 0.3 to 1.0 cc. being given. The strains of *L. icterohaemorrhagiae* employed had all been isolated from wild rats (*Rattus norvegicus*) in Washington, D. C., or Richmond, Va. They produced jaundice, hemorrhages, and death in nearly all young mice and guinea pigs into which they were injected. WRZ–1 had been carried in mice for 39 transfers during the period from July 22, 1941, to March 21, 1942, before hamsters were inoculated with it. WR–1 had been carried 23 generations in mice from December 19, 1941, to March 25, 1942, while strain 18 had been through 18 passages in mice during an interval of 2 months. Strains 301 and 626 had been carried through 76 and 63 generations, respectively, in mice before use in these experiments.

Infective *L. canicola* material consisted of two strains. The first of these, No. 189, was isolated by Dr. G. Brigham and had been

carried in guinea pigs for 143 generations before it was received at the National Institute of Health, and for 52 further passages before hamsters were injected with it. Strain A was obtained from the laboratories of the Army Veterinary School where the problem of leptospirosis is being studied. It was isolated from a spaniel which was apparently the source of infection for a human case of canicola fever occurring in Washington, D. C. This organism failed to produce infection in white mice, induced fever and weight loss in guinea pigs, and agglutinated specifically with anticanicola immune serum.

Two immune serums were used. Both were prepared in rabbits. The anticanicola immune serum agglutinated *L. canicola* to a titre of 1:100,000 and *L. icterohaemorrhagiae* to a titre of 1:100 while the anti-icterohaemorrhagiae serum agglutinated the homologous organism to a titre of 1:1,000,000 and the heterologous one to a titre of 1:100,000.

EXPERIMENTAL

Susceptibility of hamsters to infections with L. canicola.—A 10 percent emulsion of liver and kidneys of a guinea pig inoculated with the 194th passage of strain 189 in these animals was prepared. Leptospirae were observed in this suspension. Doses of 0.6 cc. were given intraperitoneally to each of 2 hamsters which were 3 weeks old. Both animals died in 4 days. At autopsy hemorrhages were found in the lungs and examination of peritoneal fluid under dark-field illumination showed many active leptospirae. A 10 percent saline emulsion of liver and kidneys of one of these animals was used to propagate the passage in hamsters. The series was passed through 8 generations of hamsters varying in age from 2 to 7 weeks. No survivors were noted in the 16 used. The survival periods from date of inoculation to date of death ranged from 4 to 10 days and averaged 6 days.

A 5-day culture of strain A grown on Verwoort's medium was used to inoculate 6 guinea pigs weighing about 150 gm., 10 mice 3 weeks old, and 5 hamsters 4 weeks old. All were inoculated intraperitoneally with 0.3 cc. of this culture. No deaths occurred among the mice or guinea pigs but all the hamsters died on the fifth and sixth days following injection. Tissues of these animals were shown to contain leptospirae and were used to infect 5 more hamsters which died 4 days later. Similar results were obtained upon repetition of this experiment.

Susceptibility of hamsters to infection with L. icterohaemorrhagiae.—A 10 percent emulsion of liver and kidneys of a mouse dying in the 63rd passage of strain 626 was used to initiate infection in 4 hamsters of undetermined age. These were injected intraperitoneally with 0.6 cc. of the tissue emulsion and all died 4 days after inoculation. At autopsy leptospirae were detected in the tissue by dark-field illumi-

nation. The tissues were icteric and hemorrhages were present in the abdominal muscles, lungs, and kidneys. An emulsion of pooled tissues from these animals was given intraperitoneally to 4 guinea pigs which developed fever, jaundice, and hemorrhages into various tissues and died 5 to 7 days after injection. Ten percent emulsions of liver and kidney from each hamster were prepared and 0.6 cc. of each was given to lots of 5 mice and 2 hamsters. The 20 mice died with typical findings of leptospirosis icterohaemorrhagica and all hamsters were dead on the fourth day following inoculation. It was thus demonstrated that hamsters were susceptible to infection with *L. icterohaemorrhagiae* and that material taken from them was capable of infecting other hamsters as well as producing typical signs and lesions of leptospirosis icterohaemorrhagica in mice and guinea pigs. For the next 5 passages groups of mice were injected with the same material as was given to each succeeding lot of hamsters. In each passage the material induced jaundice, hemorrhages, and death in both species of host. Thirteen further passages were made in hamsters before the work was discontinued. A total of 53 hamsters were used and all died as a result of infection. The ages of the hamsters varied from 3 weeks to full maturity. Death occurred in from 3 to 13 days after inoculation, with an average of 4.9 days.

Four other strains of *L. icterohaemorrhagiae* were also used for serial passage in hamsters. The results are shown in table 1.

TABLE 1.—*The number of passages, number of hamsters, age range, and survival period among 153 hamsters dying after inoculation of* L. icterohaemorrhagiae

Strain	Number of passages	Number of hamsters used	Age range of hamsters used	Range of survival period (days)	Average survival period (days)
626	19	53	3 weeks-adult	3–13	4.9
WRZ-1	13	26	3–8 weeks	3–10	5.9
301	19	38	do	3–10	5.2
18	5	10	3–6 weeks	4–10	5.8
WR-1	13	26	3–8 weeks	2–13	5.8

STUDIES OF IMMUNE SERUM UPON COURSE OF LEPTOSPIROSIS IN HAMSTERS

In view of the fact that hamsters are susceptible to infections with both *L. icterohaemorrhagiae* and *L. canicola*, tests were made to determine the effect of specific antiserums upon the course of infection in these animals. The agents used to infect the animals were strain 626 and strain A. Cultures of these organisms in Verwoort's medium were diluted with equal parts of normal rabbit serum or 1:5 dilutions of specific antiserum, held at room temperature for 2 hours, and administered intraperitoneally in 0.6 cc. amounts to the desired number of animals. Twenty hamsters were included in each age group in-

jected and 4 age groups were studied (19, 43, 50, and 250 days old). Five animals in each age group were given strain A (*L. canicola*) or strain 626 (*L. icterohaemorrhagiae*) mixed either with normal serum or specific immune serum. The results are shown in table 2. It is apparent that hamsters within the age range used are uniformly susceptible to infections with *L. canicola* and *L. icterohaemorrhagiae* and that specific immune serum administered simultaneously with the infectious agent fully controlled the cause of infection.

TABLE 2.—*Effect of specific immune rabbit serum administered simultaneously with an infective dose of* L. canicola (*strain A*) *or* L. icterohaemorrhagiae (*strain 626*) *in hamsters*

Age of hamsters (days)	Infected with *L. canicola*				Infected with *L. icterohaemorrhagiae*			
	Serum given		No serum given		Serum given		No serum given	
	Number inoculated	Number of deaths	Number inoculated	Number of deaths	Number inoculated	Number of deaths	Number inoculated	Number of deaths
19	5	0	5	0	5	0	5	5
43	5	0	5	5	5	0	5	5
50	5	0	5	5	5	0	5	5
250	5	0	5	5	5	0	5	4

An experiment was performed in order to determine the value of specific immune serum in the treatment of *L. canicola* infections in hamsters. The same infective agent and immune serum used in the foregoing experiment were again employed. Twenty-seven hamsters 19 days old were inoculated intraperitoneally with 0.3 cc. of a culture of strain A grown on Verwoort's medium. On the following day 5 hamsters were given 0.5 cc. of a 1:5 dilution of anticanicola rabbit immune serum intraperitoneally and 7 were given a 1:5 dilution of normal rabbit serum by the same route. Lots of 5 hamsters each were treated with immune serum in a like manner on the second, third, and fourth days following inoculation. The results are shown in table 3 and demonstrate that specific immune serum is of value in the treatment of *L. canicola* infections in hamsters for at least 3 days after infection has been induced.

TABLE 3.—*Effect of specific immune rabbit serum and normal rabbit serum administered at varying intervals after an infective dose of* L. canicola *in 19-day-old hamsters*

Type of serum	Dose (cc.) (diluted 1:5)	Interval (days between infecting dose and administration of serum)	Number of hamsters treated	Number of hamsters surviving	Interval (days) between infecting dose and death
Normal rabbit serum	0.5	1	7	0	5-6
Immune rabbit serum	.5	1	5	5	
Do	.5	2	5	5	
Do	.5	3	5	5	
Do	.5	4	5	1	5

DISCUSSION

The susceptibility of hamsters to both *L. icterohaemorrhagiae* and *L. canicola* has been demonstrated. Their addition to the group of animals already known to be liable to infection with leptospirae should be of value in the isolation and identification of leptospirae found in man and certain animals. This is especially true in the instance of *L. canicola* infections for no other convenient animal has been shown to develop lesions or to succumb readily when infected with this organism. With a more sensitive animal at hand it may be possible to isolate the organism with greater frequency than was possible when attempts at isolation had to be made in guinea pigs whose response to these organisms is not well defined. Identification of leptospirae can also be made on the basis of the variation in reactions of different hosts to *L. canicola* and *L. icterohaemorrhagiae*. The latter organism causes jaundice, hemorrhage, and death in hamsters, young mice, and small guinea pigs while the former does not produce symptoms in mice, causes weight loss, a febrile reaction, and infrequently death in guinea pigs and causes hemorrhages and death in hamsters.

SUMMARY

Hamsters (*Cricetus auratus*) are susceptible to infections with both *L. canicola* and *L. icterohaemorrhagiae*.

Specific rabbit immune serum protects hamsters against infections with either organism and anticanicola serum serves as a therapeutic agent if administered early in the course of illness to hamsters exposed to *L. canicola*.

REFERENCES

(*1*) Meyer, K. F., Stewart-Anderson, B., and Eddie, B.: Canine leptospirosis in the United States. J. Am. Vet. Med. Assoc., **95**: 710 (1939).

(*2*) Walch-Sorgdrager, B.: Leptospiroses. Bull. Health Organ., League of Nations, **8**: 143 (1939).

(*3*) Morton, H. E.: Susceptibility of Syrian hamsters to leptospirosis. Proc. Soc. Exper. Biol. & Med., **49**: 566 (1942).

(*4*) Larson, C. L.: Susceptibility of young mice (*Mus musculus*) *to Leptospira icterohaemorrhagiae*. Pub. Health Rep., **56**: 1546 (1941).

TYPHOID EPIDEMIC IN INDIANA DUE TO EATING GREEN CHEESE MADE FROM UNPASTEURIZED MILK

According to Dr. Thurman B. Rice,[1] the typhoid fever epidemic in Indiana early this year is the worst that the State has experienced in many years. Up to March 15, 1944, there had been 225 proved cases and 12 deaths officially reported; and although the source of the infection has been discovered and eliminated, further secondary cases and possibly deaths may be expected.

The report by Dr. Rice sets forth some unusual obstacles sur-

[1] Monthly Bulletin, Indiana State Board of Health, February 1944.

mounted by the epidemiological investigation leading to the final determination of the source of the infection and of the method of spread. From the beginning, the epidemic presented serious technical difficulties for the reason that the cases were spread over 18 counties in the northern part of the State, and involved other peculiarities. Early in the investigation, however, it was hypothecated that the epidemic was due to some food produced in the central area and distributed over that area to dealers by automobile delivery, as the cases followed closely a particular Federal highway. The hypothesis was proved to be correct, and the epidemiological findings may be summarized as follows: Sometime during December 1943 unpasteurized milk was used by a plant manufacturing cheese. The typhoid organism was present in this milk, probably having come from a farmer or a dairyman who was a carrier. The organisms then grew in the manufactured product and became virulent. If the cheese had been allowed to age, as is usually the case, the organism would probably have been killed after a few weeks, but the cheese was sold while quite green and still infectious.

When the cheese was shown to be the source of the infection, the product was taken off the market, but the name of the company involved was not disclosed, inasmuch as that company was no longer manufacturing cheese, having been succeeded by another firm. Later, however, in view of the fact that people frequently keep cheese in the icebox for some time, it was found advisable to identify the company.

Dr. Rice states: "We are proud that we were able to find the source and that we can tell the people there will be no repetition from this source at least. The public should be warned, however, that there are many sanitary short cuts being taken now due primarily to the fact that we have labor shortages and shortages of critical materials. The public would do well to lean backward in insisting upon sanitation. Typhoid fever can easily come back and take up its program where it was compelled to leave off for the most part some years ago."

DEATHS DURING WEEK ENDED APRIL 8, 1944

[From the Weekly Mortality Index, issued by the Bureau of the Census, Department of Commerce]

	Week ended Apr. 8, 1944	Corresponding week, 1943
Data for 92 large cities of the United States:		
Total deaths	9,268	9,650
Average for 3 prior years	9,019	
Total deaths, first 14 weeks of year	141,181	141,790
Deaths under 1 year of age	616	647
Average for 3 prior years	556	
Deaths under 1 year of age, first 14 weeks of year	8,801	9,964
Data from industrial insurance companies:		
Policies in force	66,400,833	65,479,985
Number of death claims	12,472	13,830
Death claims per 1,000 policies in force, annual rate	9.8	10.6
Death claims per 1,000 policies, first 14 weeks of year, annual rate	11.2	10.7

PREVALENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED APRIL 15, 1944

Summary

For the fourth successive week the incidence of meningococcus meningitis for the country as a whole declined. A total of 466 cases was reported, as compared with 499 last week, 605 for the corresponding week last year, and a 5-year (1939–43) median of 49. Increases were reported in only 3 of the 9 geographic divisions—the East North Central, the East South Central, and the Pacific. Nine States reporting 18 or more cases each for the week (last week's figures in parentheses) are as follows: *Increases*—Illinois 42 (30), Michigan 35 (28), Tennessee 25 (12), California 40 (29); *decreases*—New York 40 (53), New Jersey 18 (22), Pennsylvania 33 (38), Ohio 22 (24), Missouri 19 (26). The cumulative total for the year to date is 8,143 cases, as compared with 7,052 for the same period last year and a 5-year median of 766.

A slight increase occurred in the incidence of measles, and a slight decrease in that of scarlet fever: 30,759 cases of measles and 7,238 of scarlet fever were reported, as compared with 5-year medians of 25,994 and 4,409, respectively. The cumulative total for measles to date, 367,638 cases, has been exceeded only once since 1938, which was in 1941, when the figure for the corresponding period was 437,994. The cumulative total for scarlet fever is 91,350 and is higher than that for any other year since 1937, when 103,233 cases were reported for the corresponding period.

Current reports for the week for diphtheria, influenza, smallpox, typhoid fever, and whooping cough are below the corresponding 5-year medians, as are also the cumulative figures for all of these diseases except influenza. A total of 20 cases of poliomyelitis was reported, as compared with 16 last week and a 5-year median of 18.

Deaths registered in 92 large cities of the United States for the week totaled 9,558, as compared with 9,268 last week and a 3-year (1941-43) average of 9,216. The total to date this year is 150,771, as compared with 151,699 for the same period last year.

Telegraphic morbidity reports from State health officers for the week ended April 15, 1944, and comparison with corresponding week of 1943 and 5-year median

In these tables a zero indicates a definite report, while leaders imply that, although none was reported, cases may have occurred.

Division and State	Diphtheria: Week ended— Apr. 15, 1944	Diphtheria: Week ended— Apr. 17, 1943	Diphtheria: Median 1939–43	Influenza: Week ended— Apr. 15, 1944	Influenza: Week ended— Apr. 17, 1943	Influenza: Median 1939–43	Measles: Week ended— Apr. 15, 1944	Measles: Week ended— Apr. 17, 1943	Measles: Median 1939–43	Meningitis, meningococcus: Week ended— Apr. 15, 1944	Meningitis, meningococcus: Week ended— Apr. 17, 1943	Meningitis, meningococcus: Median 1939–43
NEW ENGLAND												
Maine	0	0	0	2	2	2	317	12	56	9	5	1
New Hampshire	1	0	0	------	------	------	8	27	34	2	2	0
Vermont	0	0	0	------	------	------	156	279	48	0	0	0
Massachusetts	8	3	3	------	------	------	1, 013	1, 834	1, 032	5	40	2
Rhode Island	1	0	0	26	1	------	195	14	51	4	8	0
Connecticut	0	0	0	3	3	3	612	430	430	7	17	1
MIDDLE ATLANTIC												
New York	7	36	19	[1] 2	[1] 17	[1] 17	2, 317	2, 903	1, 839	40	69	7
New Jersey	3	8	5	7	19	10	1, 831	1, 937	829	18	23	2
Pennsylvania	10	12	18	2	2	------	898	2, 295	1, 264	33	43	9
EAST NORTH CENTRAL												
Ohio	2	13	11	29	14	14	1, 183	1, 196	538	22	18	0
Indiana	2	3	5	7	66	24	224	616	143	8	16	1
Illinois	17	28	17	92	30	30	1, 281	1, 545	665	42	13	1
Michigan [2]	6	8	8	1	11	11	812	1, 616	464	35	17	3
Wisconsin	4	3	1	37	34	89	2, 758	2, 277	953	6	4	1
WEST NORTH CENTRAL												
Minnesota	0	3	2	3	2	2	1, 116	153	178	8	2	0
Iowa	8	3	7	38	------	9	204	301	309	2	12	1
Missouri	3	3	3	1	3	3	458	392	274	19	36	3
North Dakota	1	0	1	20	4	7	81	94	26	0	0	0
South Dakota	2	1	2	------	------	------	40	125	17	2	0	0
Nebraska	0	1	1	1	2	2	166	311	67	0	1	0
Kansas	2	5	4	1	5	6	689	623	597	3	5	1
SOUTH ATLANTIC												
Delaware	1	0	0	------	------	------	12	95	13	4	6	0
Maryland [2]	5	0	1	10	6	11	869	168	215	12	16	3
District of Columbia	0	0	2	------	1	1	195	83	83	2	2	0
Virginia	4	3	9	274	277	313	1, 094	488	486	9	27	2
West Virginia	1	5	5	2	33	35	583	116	116	6	5	2
North Carolina	10	4	11	3	2	21	1, 486	173	538	9	26	1
South Carolina	3	4	8	219	630	442	304	251	211	1	18	0
Georgia	1	3	7	43	80	92	299	406	203	5	12	1
Florida	1	4	4	79	16	9	326	52	127	3	19	0
EAST SOUTH CENTRAL												
Kentucky	2	5	4	4	6	6	81	361	126	10	14	0
Tennessee	3	5	4	43	78	87	293	360	145	25	10	1
Alabama	8	5	8	87	108	136	430	243	144	13	6	4
Mississippi [2]	2	7	5	------	------	------	------	------	------	12	14	2
WEST SOUTH CENTRAL												
Arkansas	1	2	4	35	28	99	437	193	171	[3] 3	[3] 1	1
Louisiana	2	9	9	7	16	20	163	84	167	8	2	1
Oklahoma	3	3	6	76	105	137	304	51	136	5	4	1
Texas	23	29	28	583	1, 378	933	3, 401	1, 297	1, 297	12	13	2
MOUNTAIN												
Montana	2	1	1	5	------	3	124	197	106	1	0	0
Idaho	0	0	0	------	2	2	78	67	67	1	5	0
Wyoming	0	0	0	------	20	------	80	126	79	3	1	0
Colorado	4	12	12	31	25	25	225	752	375	6	4	1
New Mexico	0	0	1	2	2	6	175	22	29	2	1	1
Arizona	2	1	1	61	108	101	348	77	53	3	6	0
Utah [2]	0	0	0	22	------	6	15	207	207	2	0	0
Nevada	0	0	0	------	6	------	16	36	0	1	1	0
PACIFIC												
Washington	5	4	0	4	3	3	133	716	716	3	12	0
Oregon	10	3	3	26	11	11	134	357	354	0	11	0
California	22	5	13	29	71	186	2, 795	1, 203	1, 203	40	38	1
Total	192	244	244	1, 917	3, 227	3, 111	30, 759	27, 161	25, 994	[3] 466	[3] 605	49
15 weeks	3, 588	4, 142	4, 486	324, 632	63, 965	129, 247	367, 638	262, 946	254, 951	8, 143	7, 052	766

See footnotes at end of table.

Telegraphic morbidity reports from State health officers for the week ended April 15, 1944, and comparison with corresponding week of 1943 and 5-year median—Con.

Division and State	Poliomyelitis			Scarlet fever			Smallpox			Typhoid and paratyphoid fever [4]		
	Week ended—		Median 1939–43	Week ended—		Median 1939–43	Week ended—		Median 1939–43	Week ended—		Median 1939–43
	Apr. 15, 1944	Apr. 17, 1943		Apr. 15, 1944	Apr. 17, 1943		Apr. 15, 1944	Apr. 17, 1943		Apr. 15, 1944	Apr. 17, 1943	
NEW ENGLAND												
Maine	0	0	0	59	14	14	0	0	0	2	0	1
New Hampshire	0	0	0	4	8	7	0	0	0	0	1	0
Vermont	0	0	0	11	4	5	0	0	0	0	0	0
Massachusetts	0	1	0	450	660	206	0	0	0	0	2	1
Rhode Island	0	0	0	15	24	12	0	0	0	0	0	0
Connecticut	0	0	0	106	114	97	0	0	0	0	0	2
MIDDLE ATLANTIC												
New York	2	0	1	535	635	635	0	0	0	4	0	5
New Jersey	0	1	0	401	125	214	0	0	0	0	3	3
Pennsylvania	2	1	0	710	376	376	0	0	0	5	6	6
EAST NORTH CENTRAL												
Ohio	0	0	0	609	273	310	1	4	1	1	2	2
Indiana	0	0	0	177	122	137	0	3	1	2	0	1
Illinois	1	0	0	519	201	426	1	2	2	6	4	3
Michigan [2]	1	0	0	352	108	306	0	0	0	3	1	1
Wisconsin	0	0	0	373	377	148	0	1	1	0	0	1
WEST NORTH CENTRAL												
Minnesota	1	1	0	182	71	52	0	0	0	0	0	0
Iowa	0	0	0	317	57	57	0	1	3	0	0	1
Missouri	0	2	0	197	152	109	0	2	3	0	0	1
North Dakota	0	0	0	40	6	7	0	0	0	0	1	1
South Dakota	0	0	0	35	19	19	0	0	0	0	0	0
Nebraska	0	0	0	26	117	27	0	0	0	0	0	0
Kansas	0	0	0	97	56	56	0	0	0	0	1	1
SOUTH ATLANTIC												
Delaware	0	0	0	19	7	7	0	0	0	0	0	0
Maryland [3]	0	0	0	242	148	47	0	0	0	0	0	1
District of Columbia	0	0	0	135	16	18	0	0	0	0	1	1
Virginia	1	0	0	107	30	32	0	0	0	5	2	2
West Virginia	0	0	1	82	26	29	0	0	0	10	4	1
North Carolina	1	0	0	39	47	22	0	3	0	2	0	2
South Carolina	0	0	0	2	3	4	0	0	0	0	1	2
Georgia	0	0	0	29	10	14	0	0	0	4	1	2
Florida	0	0	0	10	8	5	0	0	0	0	1	2
EAST SOUTH CENTRAL												
Kentucky	0	1	1	96	38	79	1	0	0	1	5	5
Tennessee	0	0	1	116	38	66	0	0	1	1	1	1
Alabama	1	2	0	17	9	12	0	1	0	0	1	3
Mississippi [2]	0	1	0	16	10	7	0	0	0	0	2	1
WEST SOUTH CENTRAL												
Arkansas	0	0	0	6	7	6	0	3	3	1	0	1
Louisiana	0	0	0	8	5	7	2	0	0	4	5	5
Oklahoma	0	0	0	22	16	17	2	0	0	4	1	1
Texas	4	1	1	84	63	50	1	1	1	0	8	6
MOUNTAIN												
Montana	0	0	0	60	6	20	0	0	0	0	0	0
Idaho	0	0	0	34	42	6	0	1	1	0	0	0
Wyoming	0	0	0	22	54	12	0	0	0	0	0	0
Colorado	0	0	0	58	45	34	0	0	0	1	0	0
New Mexico	0	1	1	10	17	10	0	0	0	3	3	1
Arizona	0	1	0	23	11	6	2	0	0	2	0	0
Utah [2]	0	0	0	93	30	16	0	0	0	0	0	0
Nevada	0	0	0	3	4	4	0	0	0	0	0	0
PACIFIC												
Washington	1	0	0	320	44	39	0	0	0	0	0	1
Oregon	0	1	0	147	38	14	0	2	2	1	1	1
California	5	5	2	223	192	129	0	0	0	5	1	3
Total	20	19	18	7,238	4,483	4,409	10	24	31	67	59	83
15 weeks	331	378	371	91,350	59.767	59,767	184	395	670	1,079	802	1,137

See footnotes at end of table.

Telegraphic morbidity reports from State health officers for the week ended April 15, 1944, and comparison with corresponding week of 1943 and 5-year median—Con.

Division and State	Whooping cough			Week ended Apr. 15, 1944								
	Week ended—		Median 1939–43	Anthrax	Dysentery			Encephalitis, infectious	Leprosy	Rocky Mt. spotted fever	Tularemia	Typhus fever
	Apr. 15, 1944	Apr. 17, 1943			Amebic	Bacillary	Unspecified					
NEW ENGLAND												
Maine	0	44	43	0	0	0	0	0	0	0	0	0
New Hampshire	0	0	4	0	0	0	0	0	0	0	0	0
Vermont	15	15	28	0	0	0	0	0	0	0	0	0
Massachusetts	101	127	175	0	0	0	0	0	0	0	0	0
Rhode Island	2	52	26	0	0	0	0	0	0	0	0	0
Connecticut	36	31	40	0	0	0	0	0	0	0	0	0
MIDDLE ATLANTIC												
New York	94	346	430	0	0	17	0	1	0	0	0	0
New Jersey	32	186	186	0	0	0	0	0	0	0	0	0
Pennsylvania	71	246	308	0	2	0	0	1	0	0	0	0
EAST NORTH CENTRAL												
Ohio	45	191	187	0	0	0	0	2	0	0	0	0
Indiana	13	73	57	0	0	0	2	0	0	0	0	0
Illinois	34	150	150	0	2	11	0	1	0	0	0	0
Michigan [2]	42	255	149	0	0	3	0	0	0	0	0	0
Wisconsin	65	213	168	0	0	0	0	0	0	0	0	0
WEST NORTH CENTRAL												
Minnesota	10	87	49	0	2	1	0	0	0	0	0	0
Iowa	20	17	17	0	0	0	0	0	0	0	0	0
Missouri	11	51	25	0	0	0	0	0	0	0	0	0
North Dakota	7	2	12	0	0	0	0	0	0	0	0	0
South Dakota	1	2	2	0	0	0	0	0	0	0	0	0
Nebraska	19	9	9	0	0	0	0	0	0	0	0	0
Kansas	28	94	63	0	0	0	0	0	0	0	0	0
SOUTH ATLANTIC												
Delaware	0	1	4	0	0	0	0	0	0	0	0	0
Maryland [2]	37	105	64	0	0	0	0	2	0	0	0	0
District of Columbia	3	28	19	0	0	0	0	0	0	0	0	0
Virginia	48	125	56	0	0	0	28	0	0	1	0	0
West Virginia	39	54	49	0	0	0	0	0	0	0	0	0
North Carolina	105	152	152	0	0	0	0	0	0	0	1	0
South Carolina	67	30	82	0	0	5	0	0	0	0	0	0
Georgia	12	38	32	0	2	1	0	0	0	0	5	8
Florida	25	17	17	0	2	1	0	1	0	0	0	2
EAST SOUTH CENTRAL												
Kentucky	28	42	42	0	0	0	0	0	0	0	0	0
Tennessee	29	79	48	0	0	0	0	1	0	0	0	0
Alabama	18	80	48	0	0	0	0	0	0	0	1	3
Mississippi [3]	------	------	------	0	0	0	0	0	0	0	1	3
WEST SOUTH CENTRAL												
Arkansas	11	25	24	0	1	1	0	0	0	0	2	0
Louisiana	1	18	11	0	1	0	0	0	0	0	1	3
Oklahoma	1	33	20	0	0	0	0	1	0	0	0	0
Texas	213	690	337	0	9	233	[5] 0	0	0	0	0	22
MOUNTAIN												
Montana	4	13	12	0	0	0	0	0	0	0	0	0
Idaho	2	12	12	0	0	0	0	0	0	0	0	0
Wyoming	12	1	3	0	0	0	0	1	0	0	0	0
Colorado	39	8	46	0	0	0	0	0	0	0	0	0
New Mexico	7	19	29	0	0	0	0	0	0	0	0	0
Arizona	26	18	24	0	0	0	32	0	0	0	0	0
Utah [2]	33	75	69	0	1	0	0	0	0	0	0	0
Nevada	13	3	3	0	0	0	0	0	0	0	0	0
PACIFIC												
Washington	51	43	50	0	0	0	0	0	0	0	0	0
Oregon	18	18	19	0	0	0	0	0	0	0	0	0
California	88	410	309	0	0	4	0	0	0	0	0	0
Total	1,576	4,328	3,645	0	22	277	62	12	0	1	11	41
15 weeks	27,196	60,208	60,208	16	394	3,087	958	151	9	5	150	569
15 weeks, 1943	------	------	------	23	441	2,943	670	166	7	9	258	715

[1] New York City only.
[2] Period ended earlier than Saturday.
[3] Exclusive of delayed reports (included in cumulative totals only), Arkansas, current week, 18 cases; corresponding week last year, 15 cases.
[4] Including paratyphoid fever cases reported separately as follows: Louisiana, 1; New Mexico, 1.
[5] A water-borne outbreak of dysentery, with approximately 500 cases, was reported as occurring on Mar. 18 at Bay City, Texas.

WEEKLY REPORTS FROM CITIES

City reports for week ended April 1, 1944

This table lists the reports from 85 cities of more than 10,000 population distributed throughout the United States, and represents a cross section of the current urban incidence of the diseases included in the table.

	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
NEW ENGLAND												
Maine:												
Portland	0	0		0	29	0	1	0	9	0	0	0
New Hampshire:												
Concord	0	0		0	3	0	0	0	0	0	0	0
Vermont:												
Barre	0	0		0	0	0	0	0	0	0	0	0
Massachusetts:												
Boston	2	0		2	177	10	19	0	97	0	0	7
Fall River	0	0		0	42	1	3	0	1	0	0	3
Springfield	0	0		0	36	1	1	0	34	0	0	3
Worcester	0	0		0	4	0	10	0	56	0	0	4
Rhode Island:												
Providence	0	0		0	175	2	9	0	5	0	0	5
Connecticut:												
Bridgeport	0	0		0	24	0	0	0	8	0	0	1
Hartford	1	0		0	10	1	1	0	18	0	0	1
New Haven	0	0		0	117	2	2	0	1	0	0	3
MIDDLE ATLANTIC												
New York:												
Buffalo	0	0		2	3	2	5	0	34	0	0	2
New York	12	0	6	0	1,925	39	83	0	358	0	2	28
Rochester	0	0		0	5	4	6	0	7	0	0	2
Syracuse	0	0		0	6	1	4	0	8	0	0	2
New Jersey:												
Camden	0	0	1	1	11	1	3	0	90	0	0	0
Newark	0	0		0	184	4	4	0	29	0	0	4
Trenton	0	0		0	10	1	1	0	6	0	0	1
Pennsylvania:												
Philadelphia	8	0	5	7	48	22	43	0	128	0	0	14
Pittsburgh	1	0	1	1	53	4	20	0	84	0	0	2
Reading	0	0		0	3	0	6	0	1	0	0	0
EAST NORTH CENTRAL												
Ohio:												
Cleveland	0	0	2	0	493	7	20	0	114	0	1	11
Columbus	0	0	1	1	106	0	2	0	9	0	0	8
Indiana:												
Fort Wayne	1	0		1	2	0	5	0	6	0	0	0
Indianapolis	2	0		1	83	4	6	0	82	0	0	5
South Bend	0	0		0	2	0	0	0	4	0	0	0
Terre Haute	0	0		0	0	0	3	0	4	0	0	0
Illinois:												
Chicago	3	0		0	123	18	19	0	207	0	1	26
Springfield	0	0		0	64	0	5	0	5	0	0	1
Michigan:												
Detroit	3	0	5	1	107	14	13	0	147	0	0	18
Flint	0	0		0	20	2	3	0	5	0	0	1
Grand Rapids	0	0		0	108	1	4	0	6	0	0	0
Wisconsin:												
Kenosha	0	0		0	45	1	0	0	2	0	0	0
Milwaukee	1	0	2	2	117	4	2	0	85	0	0	16
Racine	0	0		0	15	0	2	0	4	0	0	11
Superior	0	0		0	5	0	0	0	34	0	0	1
WEST NORTH CENTRAL												
Minnesota:												
Duluth				0	38	1	1	0	14	0	0	3
Minneapolis	0	0		0	443	1	8	0	58	0	0	7
St. Paul	4	0		0	662	3	6	0	39	0	0	2
Missouri:	0	0										
Kansas City				0	108	3	7	0	53	0	0	2
St. Joseph	0	0		0	1	0	0	0	3	0	0	0
St. Louis	0	0	3	0	174	18	9	0	45	0	0	2
Nebraska:												
Omaha	0	0		0	28	1	6	0	39	0	0	0
Kansas:	1	0										
Topeka				0	55	0	4	0	3	0	0	1
Wichita	0	0		0	92	0	1	0	7	0	0	0

City reports for week ended April 1, 1944—Continued

	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
SOUTH ATLANTIC												
Delaware:												
Wilmington	1	0		0	2	2	3	0	1	0	0	0
Maryland:												
Baltimore	1	0	1	0	878	3	11	0	97	0	0	21
Cumberland	0	0		0	1	0	1	0	0	0	0	0
Frederick	0	0		0	1	0	0	0	3	0	0	0
District of Columbia:												
Washington	2	0	1	0	125	5	12	0	159	0	0	2
Virginia:												
Lynchburg	0	0		0	1	1	0	0	0	0	0	0
Richmond	0	0	1	0	197	1	2	0	2	0	3	0
Roanoke	0	0		0	51	0	1	0	1	0	0	0
West Virginia:												
Charleston	0	0		0	4	0	0	0	29	0	0	0
Wheeling	0	0	1	0	15	1	1	0	26	0	0	3
North Carolina:												
Winston-Salem	0	0		0	46	0	0	0	0	0	0	0
South Carolina:												
Charleston	0	0	3	0	28	1	1	0	0	0	0	0
Georgia:												
Atlanta	1	0	8	0	86	0	1	0	5	0	0	0
Brunswick	0	0	1	0	3	0	3	0	0	0	0	0
Florida:												
Tampa	0	0	5	0	9	0	1	0	1	0	0	1
EAST SOUTH CENTRAL												
Tennessee:												
Memphis	0	0	1	0	12	1	5	0	17	0	0	2
Nashville	0	0		1	14	1	5	0	5	0	0	1
Alabama:												
Birmingham	0	0	4	2	16	0	7	0	3	0	0	0
Mobile	1	0		1	3	0	1	0	1	0	0	0
WEST SOUTH CENTRAL												
Arkansas:												
Little Rock	0	0		1	30	0	1	0	1	0	0	0
Louisiana:												
New Orleans	0	0	5	0	36	1	8	0	10	0	1	0
Shreveport	0	0		0	0	0	5	0	0	0	0	0
Texas:												
Dallas	3	0	1	1	162	3	6	0	4	0	0	3
Galveston	0	0		0	6	1	5	0	0	0	0	0
Houston	2	0		0	30	1	3	0	0	0	0	0
San Antonio	1	0	3	1	24	2	8	0	1	0	1	0
MOUNTAIN												
Montana:												
Billings	0	0		0	9	1	1	0	3	0	0	0
Great Falls	0	0		0	0	0	1	0	0	0	0	0
Helena	0	0		0	0	0	0	0	0	0	0	0
Missoula	0	0		0	11	0	1	0	1	0	0	0
Idaho:												
Boise	0	0		0	2	0	0	0	2	0	0	0
Colorado:												
Denver	2	0	6	0	118	9	2	0	18	0	0	13
Pueblo	0	0		0	32	0	1	0	6	0	0	2
Utah:												
Salt Lake City	0	0		0	6	0	3	0	28	0	0	1
PACIFIC												
Washington:												
Seattle	1	0	0	0	181	4	7	1	233	0	0	36
Spokane	0	0	2	2	43	2	1	0	27	0	0	0
Tacoma	1	0		0	0	0	1	0	61	0	1	1
California:												
Los Angeles	4	0	19	2	325	3	8	1	30	0	0	9
Sacramento	0	0	1	0	27	0	3	0	2	0	0	6
San Francisco	1	0	10	1	91	1	6	0	41	0	0	6
Total	60	0	99	31	8,384	216	473	2	2,726	0	10	304
Corresponding week, 1943	68	1	142	40	7,343	207	529	3	1,617	0	14	1,192
Average, 1939–43	74		383	[1] 41	[2] 5,671		[1] 493		1,516	6	17	1,083

[1] 3-year average, 1941–43.
[2] 5-year median.

Dysentery, amebic.—Cases: Boston, 1; Philadelphia, 2; Chicago, 1; Dallas, 1; San Francisco, 1.
Dysentery, bacillary.—Cases: Worcester, 8; Richmond, 1; Charleston, S. C., 3; Los Angeles, 3.
Dysentery, unspecified.—Cases: San Antonio, 4.
Leprosy.—Cases: Chicago, 1.
Typhus fever, endemic.—Cases: Los Angeles, 1.

Rates (annual basis) per 100,000 population, by geographic groups, for the 85 cities in the preceding table (estimated population, 1942, 34,063,200).

	Diphtheria case rates	Encephalitis, infectious, case rates	Influenza		Measles case rates	Meningitis, meningococcus, case rates	Pneumonia death rates	Poliomyelitis case rates	Scarlet fever case rates	Smallpox case rates	Typhoid and paratyphoid fever case rates	Whooping cough case rates
			Case rates	Death rates								
New England	7.5	0.0	0.0	5.0	1,537	42.4	114.6	0.0	571	0.0	0.0	67
Middle Atlantic	9.4	0.0	5.8	4.9	1,005	34.4	78.3	0.0	315	0.0	0.9	25
East North Central	6.2	0.0	6.2	3.7	799	31.6	52.0	0.0	442	0.0	1.2	61
West North Central	9.9	0.0	5.9	0.0	3,175	53.5	83.3	0.0	518	0.0	0.0	34
South Atlantic	9.0	0.0	37.8	0.0	2,612	25.2	66.7	0.0	584	0.0	5.4	49
East South Central	6.0	0.0	29.8	23.8	268	11.9	107.2	0.0	155	0.0	0.0	18
West South Central	17.6	0.0	26.5	8.8	847	23.5	105.9	0.0	47	0.0	5.9	9
Mountain	16.1	0.0	48.4	0.0	1,435	80.6	72.6	0.0	468	0.0	0.0	129
Pacific	12.3	0.0	56.1	8.8	1,169	17.5	45.6	3.5	690	0.0	1.8	102
Total	9.2	0.0	15.2	4.8	1,287	33.2	72.6	0.3	418	0.0	1.5	47

TERRITORIES AND POSSESSIONS

Panama Canal Zone

Notifiable diseases—February 1944.—During the month of February 1944, certain notifiable diseases were reported in the Panama Canal Zone and terminal cities as follows:

Disease	Panama		Colon		Canal Zone		Outside the Zone and terminal cities		Total	
	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths
Chickenpox	7		2		6				15	
Diphtheria	8						3		11	
Dysentery (amebic)					2		7		9	
Dysentery (bacillary)	1				4	1	3		8	1
Malaria [1]	7		3		87		32	4	129	4
Measles	2				142		1		145	
Mumps	10		8		46		3		67	
Paratyphoid fever	1				2		1		[2] 4	
Pneumonia		12		4	42	3		1	[2] 42	20
Scarlet fever							1		1	
Tuberculosis		19		1	6	3		3	6	26
Typhoid fever					1				1	

[1] 39 recurrent cases.
[2] Reported in the Canal Zone only.

Puerto Rico

Notifiable diseases—4 weeks ended January 29, 1944, and February 26, 1944.—During the 4 weeks ended January 29, 1944, and February 26, 1944, cases of certain notifiable diseases were reported in Puerto Rico as follows:

Disease	4 weeks ended—		Disease	4 weeks ended—	
	Jan. 29, 1944[1]	Feb. 26, 1944		Jan. 29, 1944[1]	Feb. 26, 1944
	Cases	Cases		Cases	Cases
Chickenpox	11	23	Mumps	2	
Diphtheria	31	39	Ophthalmia neonatorum	5	
Dysentery	12	24	Pellagra	1	
Erysipelas	2		Poliomyelitis		2
Filariasis	1	4	Scarlet fever	2	
German measles	8	24	Syphilis	551	841
Gonorrhea	510	682	Tetanus	8	6
Influenza	316	879	Tetanus, infantile	1	
Leprosy		3	Tuberculosis (all forms)	272	748
Lymphogranuloma inguinale	3	5	Typhoid fever	7	14
Malaria	305	1,153	Typhus fever, endemic	3	8
Measles	4	7	Whooping cough	42	131

[1] No report was received for the week ended Jan. 15, 1944.

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—Week ended March 18, 1944.—During the week ended March 18, 1944, cases of certain communicable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox		7		241	434	61	44	102	106	995
Diphtheria		10	5	18	4	4			1	42
Dysentery (bacillary)									2	2
German measles		10		107	69	20	66	14	31	317
Influenza	1	14			55	4			9	83
Measles		76	2	1,025	643	198	64	222	25	2,255
Meningitis, meningococcus				3	4		2			9
Mumps	2	13		190	288	79	18	49	44	683
Poliomyelitis									1	1
Scarlet fever		15	6	108	272	95	18	109	96	719
Tuberculosis (all forms)			4	112	48	12	9	5	87	227
Typhoid and paratyphoid fever				29						29
Undulant fever					2			1		3
Whooping cough		19		93	57	7	18	9	22	225

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

NOTE.—Except in cases of unusual incidence, only those places are included which had not previously reported any of the above-mentioned diseases, except yellow fever, during the current year. All reports of yellow fever are published currently.

A table showing the accumulated figures for these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.

(Few reports are available from the invaded countries of Europe and other nations in war zones.)

Plague

British East Africa—Uganda.—During the week ended March 4, 1944, 1 case of plague with 1 death was reported in Uganda, British East Africa.

Egypt—Ismailiya.—Up to April 1, 1944, 38 cases of plague with 21 deaths have been reported in Ismailiya District, Egypt.

Indochina.—For the period March 1–10, 1944, 3 cases of plague were reported in Indochina.

Morocco (French).—For the month of February 1944, 5 cases of plague were reported in Casablanca region, French Morocco.

Smallpox

India.—Smallpox has been reported in India as follows: Bombay—week ended March 11, 1944, 280 cases, 90 deaths; Calcutta—week ended March 18, 1944, 294 deaths as compared with 240 deaths reported for the preceding week.

Mexico.—For the month of February 1944, 429 cases of smallpox with 100 deaths were reported in Mexico. The States reporting the highest numbers of cases and deaths were as follows: Coahuila, 91 cases, 13 deaths; Durango, 26 cases, 2 deaths; Mexico, 28 cases, 1 death; Nueva Leon, 45 cases, 2 deaths; Oaxaca, 30 cases, 23 deaths; Vera Cruz, 114 cases, 3 deaths.

Morocco (French).—For the month of February 1944, 138 cases of smallpox were reported in French Morocco.

Typhus Fever

Chile.—For the period January 2–29, 1944, 44 cases of typhus fever with 7 deaths were reported in Chile, including 11 cases reported in Antofagasta Province, 15 cases with 3 deaths reported in Santiago Province, and 6 cases reported in Valparaiso Province.

Ecuador.—During the month of February 1944, 23 cases of typhus fever with 2 deaths were reported in Quito, Ecuador.

Mexico.—During the month of February 1944, 247 cases of typhus fever with 31 deaths were reported in Mexico. States reporting the highest incidence are as follows: Guanajuato, 13 cases, 4 deaths; Mexico, D. F., 116 cases, 9 deaths; Mexico State, 19 cases, 1 death; Puebla, 24 cases, 1 death; Queretaro, 11 cases, 2 deaths; San Luis Potosi, 6 deaths; Vera Cruz, 10 cases; Zacatecas, 11 cases, 1 death.

Morocco (French).—During the month of February 1944, 303 cases of typhus fever were reported in French Morocco.

Rumania.—For the period March 24–31, 1944, 138 cases of typhus fever were reported in Rumania.

Slovakia.—For the period March 4–18, 1944, 44 cases of typhus fever were reported in Slovakia.

Spain.—During the week ended March 4, 1944, 21 cases of typhus fever were reported in Spain.

Yellow Fever

Brazil—Acre Territory—Seabra.—On January 14, 1944, 1 death from yellow fever occurred in Seabra, Acre Territory, Brazil.

COURT DECISION ON PUBLIC HEALTH

Premarital examination law—applicable to common law marriages.—(Pennsylvania Superior Court; *Fisher* v. *Sweet & McClain et al.*, 35 A.2d 756; decided January 27, 1944.) This case was a proceeding under the Workmen's Compensation Act of Pennsylvania and presented the question as to whether there had been a common law marriage. After passing on this the superior court of the State went on to say that, while not actually raised or involved in the case, the record led it to believe that, in the light of the 1939 premarital examination statute, prior lower court rulings that State statutes providing for the issuance of marriage licenses did not apply to common law marriages should now be reconsidered. Notwithstanding certain phraseology used in the marriage license law, which had for its object the keeping of correct records of marriages within the State, it had been held in a number of lower court decisions that a license was not necessary for a common law marriage. But the superior court said that the 1939 act was a public health measure and should be construed so as to effectuate its purpose if at all possible. This law forbade, among other things, the issuance of any license to marry until the clerk of the orphans' court was in possession of a physician's statement that each applicant, within 30 days of the issuance of the marriage license, had submitted to an examination (including a standard serological test) to determine the existence or nonexistence of syphilis and that in his opinion the applicant was not infected with syphilis or, if so infected, was not in a stage of the disease which was likely to become communicable. This physician's statement had to be accompanied by a statement from the laboratory relative to the test.

The court described the statute as being clearly a public health measure designed to assist in the eradication of syphilis, to prevent the communication of syphilis by a diseased spouse to the other who was free of it, and to prevent the birth of children with syphilitic weaknesses or deformities. Certainly, said the court, the legislature never intended that such an important hygienic statute could be circumvented by the simple device of the parties entering into a common law marriage without first obtaining a license, after being examined by a physician and securing his statement of freedon from syphilis, etc., or by entering into such a marriage after a marriage license, pursuant to the statute, had been refused them. "We have no thought of attacking the validity of common law marriages. That is a matter for the legislature to handle. It is within our province, however, to hold that a valid common law marriage cannot

hereafter be entered into in this Commonwealth without first complying with the act of 1939 and securing a marriage license pursuant to its provisions."

The court accordingly ruled that, hereafter, marriage licenses had to be obtained, pursuant to the existing marriage license statutes, including the 1939 act, before any valid marriage, ceremonial or common law, could be entered into.

FEDERAL SECURITY AGENCY

UNITED STATES PUBLIC HEALTH SERVICE

THOMAS PARRAN, *Surgeon General*

DIVISION OF PUBLIC HEALTH METHODS

G. ST. J. PERROTT, *Chief of Division*

The PUBLIC HEALTH REPORTS, first published in 1878 under authority of an act of Congress of April 29 of that year, is issued weekly by the United States Public Health Service through the Division of Public Health Methods, pursuant to the following authority of law: United States Code, title 42, sections 7, 30, 93; title 44, section 220.

It contains (1) current information regarding the prevalence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

The PUBLIC HEALTH REPORTS is published primarily for distribution, in accordance with the law, to health officers, members of boards or departments of health, and other persons directly or indirectly engaged in public health work. Articles of special interest are issued as reprints or as supplements, in which forms they are made available for more economical and general distribution.

Requests for and communications regarding the PUBLIC HEALTH REPORTS, reprints, or supplements should be addressed to the Surgeon General, United States Public Health Service, Washington, D. C. Subscribers should remit direct to the Superintendent of Documents, Washington 25, D. C.

Librarians and others should preserve their copies for binding, as the Public Health Service is unable to supply the general demand for bound copies. Indexes will be supplied upon request.

UNITED STATES GOVERNMENT PRINTING OFFICE, WASHINGTON : 1944

For sale by the Superintendent of Documents, Washington 25, D. C.

Price 5 cents. Subscription price $2.50 a year

Public Health Reports

VOLUME 59 — **APRIL 28, 1944** — NUMBER 17

IN THIS ISSUE

CONTENTS

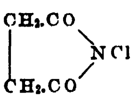
Public Health Reports

Vol. 59 • APRIL 28, 1944 • *No. 17*

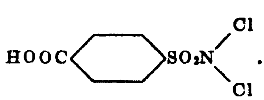
EXPERIMENTS ON THE PHARMACOLOGIC ACTION OF SUCCINCHLORIMIDE[1]

By E. F. STOHLMAN, *Assistant Pharmacologist*, and M. I. SMITH, *Chief Pharmacologist, United States Public Health Service*

In 1928 C. B. Wood (*1*) proposed the use of succinchlorimide



for the purification of water to render contaminated water potable. The need for such a compound arising from the present war conditions has created new interest in this subject. Since Wood's work, also supported by some more recent unpublished data, indicates the antibacterial superiority of this compound, it seemed desirable to make a pharmacologic study of it in comparison with the better known and generally accepted Halazone NNR (p-sulfonedichloramidobenzoic acid)



. The latter, first introduced by Dakin and Dunham (*2*) for disinfection of drinking water, was shown to be nontoxic when fed to rabbits "for many weeks in doses of 100 to 200 mg. per day, without observable symptoms, and repeated doses of 500 mg. were also without effect" (*3*). No further work on the toxicity of halazone seems to be available in the literature, nor have any toxicological data on succinchlorimide been found.

Experimental.—The sample of succinchlorimide was supplied by the Lambert Pharmacal Company, St. Louis. The halazone used in this work was obtained from Abbott Laboratories, Chicago. Parallel experiments were run to determine the acute toxicity of these compounds in rats on oral and intravenous administration; the chronic toxicity in rats when fed at different levels in the diet; the chronic toxicity in rabbits when administered orally in daily doses of 200 mg. per kg. of body weight; and lastly the pharmacodynamic action of the

[1] From the Division of Physiology, National Institute of Health.

compounds was studied in cats on intravenous infusion of solutions of the drugs in physiologic saline carefully adjusted to a pH of from 6.2 to 7.0. Succinchlorimide, which is moderately soluble in water, is acid in reaction and must be neutralized. Solutions of halazone, which is only slightly soluble in water, were prepared with the aid of N sodium hydroxide, approximately 13.0 cc. per gram of material.

Results.—The data in table 1 indicate a minimum lethal dose of 400 mg. per kg. for succinchlorimide and about 800 mg. per kg. for halazone when injected intravenously in rats. The irregularities in the results are believed to be due to the variable amount of free chlorine which both compounds yield in solutions made suitable for intravenous injection. Obviously succinchlorimide is about twice as toxic as halazone when administered by this route. The symptomatology is similar with both compounds. Dyspnea, labored respiration, and death follow within 30 minutes to 18 hours, with pulmonary congestion and edema at necropsy.

TABLE 1.—*Acute toxicity in rats on intravenous injection*

Number	Dose (mg. per kg.)	Mortality (percent)
SUCCINCHLORIMIDE		
16	200	19
8	350	12
10	400	90
HALAZONE		
12	300	25
15	400	40
9	500	22
13	600	39
8	800	100

TABLE 2.—*Acute toxicity in rats, oral administration*

Number	Dose (gm per kg.)	Mortality (percent)
SUCCINCHLORIMIDE		
8	1.0	12
10	1.5	40
10	2.0	50
13	2.7	92
HALAZONE		
9	1.0	22
9	1.5	33
11	2.0	27
15	3.0	60
11	3.5	100

The acute oral toxicity in rats is shown in table 2. In this, too, succinchlorimide appears to be the more toxic compound since at a dose of 2.0 gm. per kg. 50 percent died as compared with only 27 percent from halazone. The MLD of succinchlorimide appears to be

2.7 gm., while that of halazone 3.5 gm. per kg. Lesions of the gastric mucosa were conspicuous at necropsy in this series of experiments. No noticeable differences could be seen in the systemic effects of the two compounds.

The chronic toxicity in rats is shown in figure 1. In these experiments succinchlorimide and halazone were incorporated in concentrations of 0.1, 0.5, and 1.0 percent each in a semisynthetic diet consisting of 18 percent casein, 5 percent dried brewers' yeast, 4 percent McCollum's salt mixture No. 185, 2 percent cod liver oil, 8 percent olive oil, and the balance cornstarch. The rations were fed *ad libitum* and

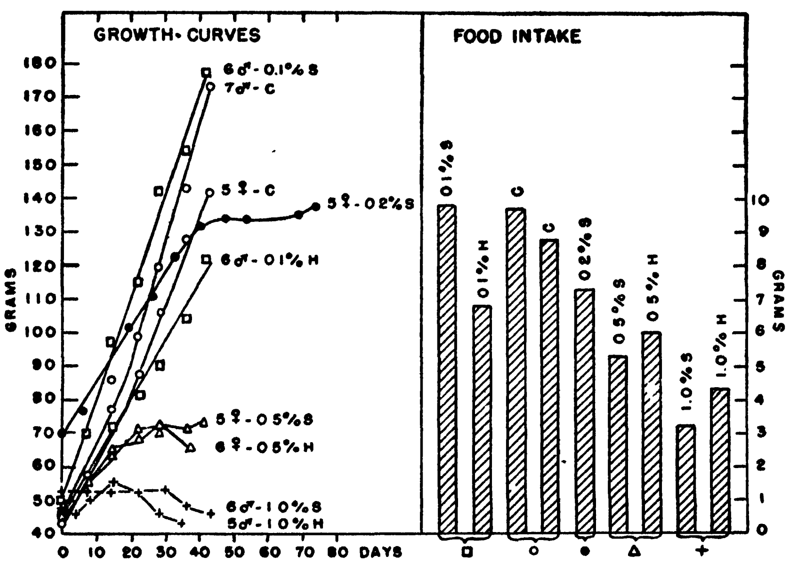


FIGURE 1.—Growth curve and food intake of groups of rats fed succinchlorimide (S) and halazone (H) in an adequate semisynthetic diet. Curves marked C represent controls. Curve 0.2 percent S represents a group of rats receiving 0.2 percent succinchlorimide in the drinking water.

the amount of food consumed noted. In one group (0.2 percent S in the chart) succinchlorimide was given in the drinking water at a concentration of 0.2 percent. Controls, animals of about the same age and weight, were fed the diet alone. All the animals were weighed weekly. At the conclusion of the experiment hemoglobin determinations were made and necropsies performed to determine the presence of gross parenchymatous lesions. In some of the experiments the retention of intravenously injected rose bengal, 25 mg. per kg., was determined at 1 hour as a measure of liver function. A glance at the chart will show that at a level of 1.0 and 0.5 percent both compounds were markedly toxic causing inhibition of growth, reduced food intake and some deaths within 30 to 40 days. At these levels no difference between the two compounds was discernible. At a level of 0.1 percent succinchlorimide exhibited no toxicity while

halazone appeared to retard growth and food intake somewhat. Two-tenths percent of succinchlorimide in the drinking water produced no demonstrable toxic effects other than some retardation of growth and reduction in food intake. At the termination of this experiment the hemoglobin levels were within the normal range and no abnormality was noted in the rose bengal clearance when tested by the method previously described (*4*). Post-mortem findings were negative. The average estimated intake of succinchlorimide per day in this experiment was a little over 200 mg. per kg.

The results of an experiment on the chronic toxicity of the two compounds in rabbits are shown in table 3. In this experiment the drugs were given by stomach tube in doses of 0.2 gm. per kg. daily, except Sundays, until a total of from 20 to 29 doses had been given. The animals were on a diet of oats and cabbage throughout. At the termination of the experiment hemoglobin determinations were made and rose bengal retention at 30 minutes following an intravenous injection of 5.0 mg. per kg. was determined. Normally the concentration of the dye in the plasma under these experimental conditions does not exceed 0.3 to 0.6 mg. percent (*5*). The bladder urine was tested for albumin and gross post-mortem findings were noted.

TABLE 3.—*Chronic toxicity in rabbits. Dose 0.2 gm. per kg daily*

Number	Total dose (gm per kg)	Weight (kg)		Hemoglobin (gm. /100 cc)		Rose bengal (mg percent at 30 min)	Urine albumin
		Initial	Final	Initial	Final		
SUCCINCHLORIMIDE							
1	2.6	1.6	1.2	16.0	---		None
2	4.0	1.3	1.3	14.5	11.9	0.2	Do
3	4.0	1.3	1.3	15.6	14.3	.3	Do
4	4.4	1.5	1.2	16.6	9.7	.9	Trace
5	5.0	1.4	1.2	14.6	10.3	.5	None
HALAZONE							
6	5.8	1.2	1.6	15.5	14.2	0.7	Trace
7	4.0	1.0	1.0	15.9	11.0	.8	Positive
8	4.8	1.2	1.4	14.2	13.9	.8	None
9	4.4	1.0	1.3	14.2	11.9	.8	Do
10	4.8	1.3	1.6	13.2	12.8	1.3	Positive.

One of the animals in the succinchlorimide group refused food during the greater part of the treatment and died in an emaciated state. Two others also showed moderate loss of weight. The animals in the halazone group maintained their weight much better. Marked reduction in hemoglobin was noted in three of the four surviving animals in the succinchlorimide group and in two of the five animals in the halazone group. One of the animals in the succinchlorimide group showed a subnormal dye clearance while four in the halazone group showed some evidence of abnormal retention of dye. Albuminuria was present in two of the halazone animals only. Inflamma-

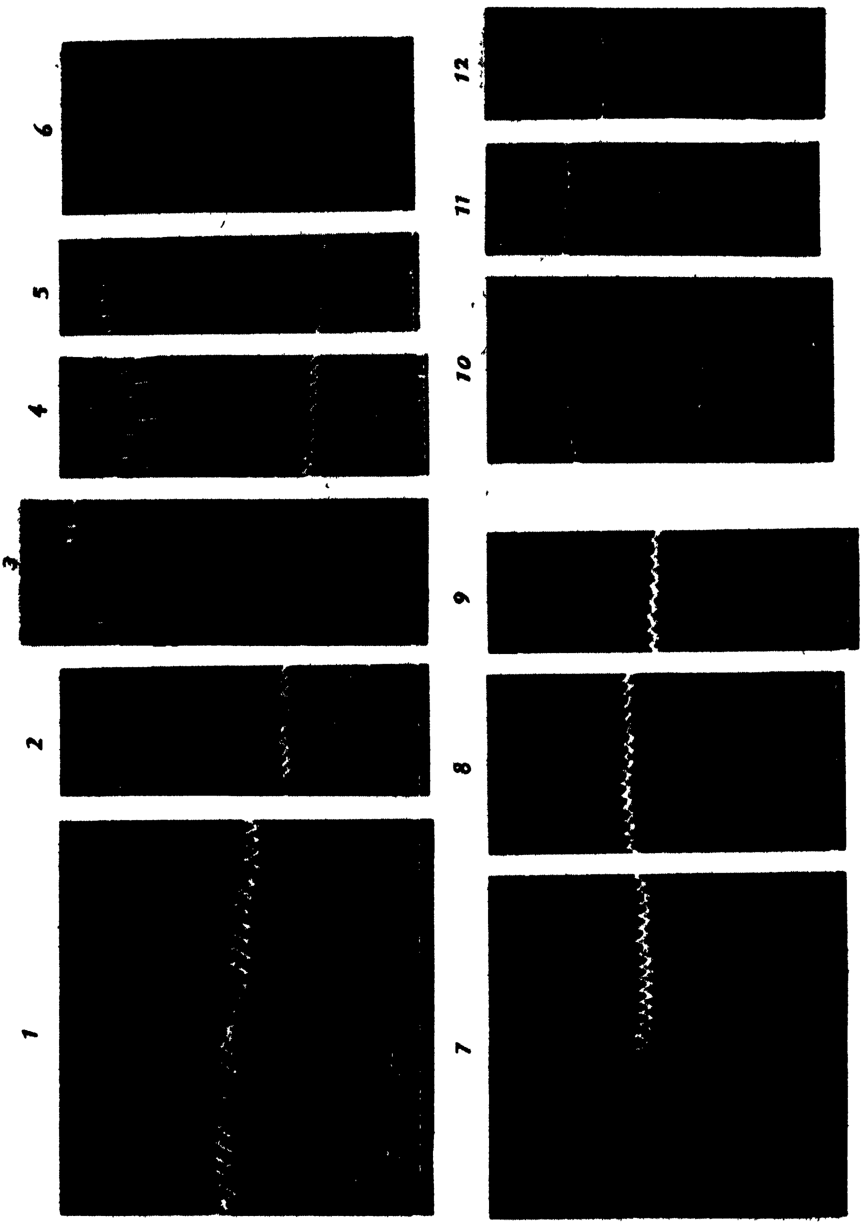


FIGURE 2.--Tracing showing the effects of continuous intravenous infusion of succinchlorimide, succinimide, and halazone in the cat. Amytal anesthesia, vagi intact. Top tracing, respiration; second, blood pressure; third, base line and injection signal; bottom, time in seconds. Tracings 1 to 6 show the effects of succinchlorimide as follows: 1, 50 mg. per kg.; 2, a total of 150 mg. per kg.; 4, 200 mg. per kg.; 5, a total of 250 mg. per kg. Tracing 3 shows the response to epinephrine after 150 mg. per kg. of succinchlorimide had been injected Tracing 6 shows the simultaneous paralysis of respiration and circulation in another cat following the continuous intravenous infusion of 200 mg. per kg. of succinchlorimide. Tracings 7 to 9 show the absence of any effects following the intravenous infusion of succinimide, 200 mg. per kg. at 8 and a total of 900 mg. per kg. at 9. The effects of halazone are shown in tracings 10 to 12, 200 mg. per kg. at 11 and a total of 300 mg. per kg. at 12.

tion of the gastric mucosa was present in all the animals in the succinchlorimide group; it was not noticeable in the halazone group. Thus the effects were generally alike in both groups, although succinchlorimide appeared to be the more toxic and the more irritant of the two.

Microscopic examination of the stomach in the animals of the succinchlorimide group revealed focal subepithelial hemorrhages, edema, and fibroblast proliferation in the mucosa, and perivascular lymphocyte infiltration in the submucosa. The animals of the halazone group showed no definite microscopic changes. One of the livers of the animals in the halazone group with a rose bengal retention of 1.3 mg. percent showed slight centrolobular atrophy and fatty degeneration. The others with slightly elevated rose bengal retention had varying degrees of coccidiosis. For the microscopic examination of the tissues the authors are indebted to Senior Surgeon R. D. Lillie of the Pathology Laboratory.

In cats under amytal anesthesia the intravenous infusion of a 1 percent solution of succinchlorimide produced a progressive fall in blood pressure. The respiration was augmented in amplitude at first, later it was slowed and decreased in amplitude. Paralysis of the respiration and circulation appears to take place almost simultaneously. Usually 100 to 150 mg. per kg. is sufficient to produce a marked and sustained fall in blood pressure while 200 to 250 mg. per kg. produces complete circulatory collapse. The vasoconstrictor response to epinephrine when tested at frequent intervals during the infusion of succinchlorimide is not abolished. Indeed, the pressor action of epinephrine is progressively augmented. This potentiation of the epinephrine vasoconstrictor response suggests inhibition of oxidative destruction of the sympathomimetic amine, a matter which will have to be investigated further. Tracings 1 to 6 in figure 2 illustrate the respiratory and circulatory effects of succinchlorimide. Succinimide, as shown in tracings 7 to 9, has no such action, while halazone although depressing to the circulation and respiration in large doses is not nearly as effective as succinchlorimide (tracings 10 to 12). Moreover, it lacks the primary stimulating action of succinchlorimide on the respiration.

CONCLUSIONS

Succinchlorimide is more toxic than halazone. In rats on intravenous injection it is about twice as toxic as halazone. The acute oral toxicity of succinchlorimide in rats is also greater than that of halazone.

The chronic toxicity of succinchlorimide when fed at tolerated levels to rats or rabbits is not demonstrably greater than that of halazone, though it appears to be more of a gastric irritant. One-tenth percent of succinchlorimide fed in the diet to rats over a period of 40 days

produced no demonstrable toxic effects. Two-tenths percent of this compound in the drinking water of rats over a period of 75 days produced only some retardation of growth and a diminished food intake.

The intravenous infusion of succinchlorimide lowers the blood pressure, first stimulates then depresses the respiration, and finally kills by almost simultaneous paralysis of the circulation and the respiration. The peripheral vasomotor mechanism does not appear to be affected by succinchlorimide since the pressor action of epinephrine is not abolished. Potentiation of the pressor action has been noted, the mechanism of which remains to be determined.

Unless succinchlorimide possesses markedly superior antibacterial properties, its use as a substitute for halazone in water disinfection is not recommended.

REFERENCES

(*1*) Wood, C. B.: Succinchlorimide proposed as a chemical agent for the preparation of potable water. Mil. Surg., 63: 493 (1928). *Reprinted in* U. S. Naval Med. Bull., 27: 223 (1929) *with* Experiments with succinchlorimide conducted at the U. S. Naval Medical School during April 1928.

(*2*) Dakin, H. D., and Dunham, E. K.: The disinfection of drinking water: with a description of a new substance for the preparation of stable tablets for the sterilization of polluted water. Brit. Med. J., 1: 682 (1917).

(*3*) Dunham, E. K., and Dakin, H. D.: Note on the fate of halazone in the animal body and on the stability of tablets containing it. Brit. Med. J., 2: 790 (1917).

(*4*) Smith, M. I., Lillie, R. D., and Stohlman, E. F.: The toxicity and histopathology of some azo compounds as influenced by dietary protein. Pub. Health Rep., 58: 304 (1943).

(*5*) Smith, M. I., Westfall, B. B., and Stohlman, E. F.: Liver function and bile pigments in experimental chronic selenium poisoning. Part III, page 32, Nat. Inst. Health Bull. No. 174, 1940.

THE PATCH TEST IN CONTACT DERMATITIS [1]

By Louis Schwartz, *Medical Director*, and Samuel M. Peck, *Senior Surgeon (R)*, *United States Public Health Service*

The patch test was devised by Jadassohn (*1*) almost 50 years ago for demonstrating the causes of contact dermatitis. In the United States the test was not widely used in industry, nor was its practical value appreciated until attention was called to the prevalence of occupational dermatitis and the chemicals causing it, and to the value of the patch test in differentiating between occupational and other sources of contact dermatitis.

The test was first used as a means of determining the actual causative irritant in cases of contact dermatitis. Since dermatitis has on many occasions been found to be caused by irritant chemicals contained in wearing apparel and cosmetics, manufacturers have taken advantage of the patch test to determine the possible skin-irritating or sensitizing properties of new products before placing them on sale to the public.

[1] From Dermatoses Section, Industrial Hygiene Division, Bureau of State Services.

Some enthusiasts have even proposed the inclusion of the patch test as part of the pre-employment examination with the idea of weeding out those workers who might develop occupational dermatitis. The fallacy of this proposal lies in the fact that most workers develop occupational dermatitis by contact with a primary irritant or by acquiring an allergy while actually employed. Pre-employment patch testing, therefore, could not weed out those who would become sensitized,

It is now universally accepted that the patch test, if properly performed and interpreted, is a valuable diagnostic procedure. Its value in preventing possible outbreaks of dermatitis from the use of materials containing new chemicals before they are put into general use is just becoming recognized.

This study is based on years of experience in investigating outbreaks of dermatitis and in testing chemicals and articles for possible skin-irritating properties. The authors have performed thousands of patch tests and have had the opportunity in many instances to correlate the results of tests with the occurrence of dermatitis when substances tested were put into actual use.

TECHNIQUE

Before an attempt is made to describe the methods used for patch testing, clear distinction must be made between substances which are primary skin irritants and those which will be called sensitizers. It is obvious that a concentrated solution of a strong acid or alkali will burn or inflame any skin, the degree of injury depending on the concentration of the irritant, the amount applied, the duration of its action, and the area of skin to which it is applied. Such chemicals actually form chemical combinations with the skin. They may precipitate the skin protein, dissolve the keratin, dehydrate the skin, oxidize the skin, etc. There is another class of chemicals which, because they dissolve out the fat and cholestrol, will cause inflammation of the skin if applied for a sufficient length of time. In this class are the strong solvents, gasoline, carbon tetrachloride, chloroform, carbon bisulfide, etc. All these are primary irritants.

A group of dermatologists acting as consultants to the Public Health Service have defined a primary skin irritant as follows:

> A primary cutaneous irritant is an agent which will cause dermatitis by direct action on the normal skin at the site of contact if it is permitted to act in sufficient intensity or quantity for a sufficient length of time

Many chemicals which are primary irritants are also sensitizers, for instance, formaldehyde, alkaline bichromates, mercuric salts, phenols, etc.

It is obvious that patch testing with strong concentrations of known primary irritants will result in reactions on any skin. This does not

mean that patch tests should not be performed with dilute solutions of chemicals which in strong concentration are primary irritants. There are published lists of concentrations of chemicals which dermatologists have used to determine hypersensitivity; these concentrations, together with the time they are to remain on the skin, are recommended in an attempt to avoid the primary irritant action of the chemical.

According to the records received from State compensation boards, the majority of occupational dermatoses are caused by primary irritants. Only about 20 percent are caused by substances which do not have a primary irritant action on the skin. These chemicals which are not primary irritants are responsible for the great majority of cases of contact dermatitis caused by wearing apparel, cosmetics, ornaments, etc. They induce a specific skin allergy and thus cause dermatitis. They may be called sensitizers and were defined as follows by the group of consultant dermatologists referred to above:

> A cutaneous sensitizer is an agent which does not necessarily cause demonstrable cutaneous changes on first contact but may effect such specific changes in the skin that, after 5 to 7 days or more, further contact on the same or other parts of the body will cause dermatitis.

The diagnostic patch test consists in applying a small portion of the suspected substance to a site of normal skin of the patient. This is covered with innocuous impermeable material which is then sealed to the skin by adhesive plaster. There have been many modifications proposed in order to overcome certain objections.

The diagnostic patch test is performed in the following manner:

With liquids.—Saturate a piece of 4-ply gauze ¼-inch square and apply it to uninflamed skin on the arm or back. The liquid from the gauze should not be permitted to trickle from the patch site. For insulation a 1-inch square of nonwaterproof cellophane is used. (Waterproof cellophane consists of regenerated cellulose coated with a water insoluble resin.) This is sealed to the skin with adhesive plaster about 2 inches square. When smaller pieces of adhesive plaster are used, patches are often lost or there is insufficient contact between the test substance and the skin. The reactions which may result from the adhesive plaster are separated from those resulting from the test substance by the uninflamed skin which is in contact only with the cellophane. In performing a number of patch tests, care should be taken to avoid overlapping of adhesive plaster as this will cause intensification of the adhesive plaster reaction.

With powders.—In performing patch tests with powders the powder is placed on a piece of gauze in order to keep the reaction localized. If the gauze is moistened, it holds the powder better than when dry.

With solids.—When solids insoluble in water are used, it has been found best to dissolve them in a solvent, making a saturated solution, and wetting a piece of gauze with this solution. The gauze is then

allowed to dry before being placed on the skin in order to eliminate the action of the solvent. This procedure deposits the precipitated, finely divided substance on the gauze, and brings about better contact with the skin.

When the insoluble solid is of a resinous character, the solution may be painted directly on the skin, the solvent allowed to evaporate, and the cellophane and adhesive plaster applied. If the resin adheres firmly to the skin, it is not necessary to cover it with the cellophane and adhesive.

With ointments.—The technique of testing with ointments is the same as with liquids.

While solvents are primary skin irritants they sometimes also act as sensitizers. When it is desired to determine whether a solvent is causing dermatitis by its action as a sensitizer, patch tests may be performed as follows: Mix equal parts of the solvent and a bland oil such as liquid petrolatum or corn oil, in order to buffer the fat solvent action of the solvent, and patch as for liquids.

It is usually sufficient to leave the patch on for 24 hours but sometimes when patching with low concentrations or with weak sensitizers it may be necessary to leave the patch on for 3 or 4 days, but not for more than 5 days as the patient may by that time become sensitized to the patch itself. This is especially true of fabrics which contain no strong irritants and to which most people do not react. The reactions should be read not only upon the removal of the patches but every day for at least 5 days thereafter. This is of special importance in testing fabrics. A late reaction indicates a lesser degree of sensitivity than an early reaction.

MODIFICATION OF THE PATCH TEST

Rokstad (*2*) has suggested a modification of the patch test for testing the primary irritant effect of volatile substances. A celluloid chamber is fixed to the skin with adhesive tape, or, in the case of sensitivity to adhesive, with a paste made of 15 gm. zinc oxide, 15 gm. gelatin, 25 gm. glycerin, and 45 cc. distilled water. The irritant solvent to be tested is placed on the skin and covered with the chamber. When applied correctly the chamber should be airtight and a papule formed by the underlying skin protruding into the chamber. The edematous papule which is thus formed facilitates absorption of the test substance.

Grolnick (*3*) advocated the use of nonmoistureproof cellophane held in place by collodion in order to avoid a possible adhesive tape reaction.

The so-called window patch test was suggested by Guild (*4*) in 1939, so that constant observation could be made and a controlled alkalinity or acidity could be maintained. A microscopic slide is cut into 1-inch squares, the edges are made smooth, and the glass square is fixed to the

skin by adhesive on three sides. The substance to be tested is introduced at the open end and then it too can be closed off.

Wedroff (*5*) has suggested that primary irritants containing volatile solvents as diluents should be painted directly on the skin or various concentrations in alcohol can be placed dropwise on the skin and left uncovered.

Sulzberger (*6*), as well as others, has advocated Scotch cellulose tape as a covering to increase the visibility.

It is often advisable to use a so-called artificial perspiration to moisten the test substance because the pH of the perspiration, especially in such areas as the axilla, may play a role in the solubility of the irritant under investigation. The pH of axillary sweat is usually on the alkaline side and that on the body proper is on the acid side; pH can vary from 5 to about 8. To approximate the pH of the perspiration, acidify the liquid used for moistening with dilute acetic acid or alkalinize with dilute ammonia.

INTERPRETATION AND READING OF PATCH TESTS

It requires considerable experience to interpret correctly reactions to patch tests. It is of practical importance to have a common basis for grading reactions. If the relative sensitivity of a worker to the chemical causing the dermatitis could be clearly indicated by the report of the patch test reaction, it could be determined by repeated patch tests whether an employee is becoming more or less sensitive in cases where there is continued contact with the sensitizing chemical. The authors are convinced that "hardening" or hyposensitization takes place in most workers exposed continually to the offending chemical (*7*).

Since the patch test was first employed, gradations of the reaction have been recorded by the symbols 1+, 2+, 3+, and 4+. By this method an erythema on the area of skin to which the chemical was applied is indicated by 1+; erythema and edema by 2+; an erythema, edema, papules, and a few vesicles by 3+; erythema, edema, many vesicles, and, in some cases, ulceration are recorded as a 4+ reaction.

Such a method of recording a positive patch test is useful perhaps in indicating the degree of sensitivity to the specific concentration and amount of the chemical used. Additional information can be obtained if patches with differing concentrations are applied. The degree of reaction will be greatest at the site of greatest concentration. It is for this reason that weak concentrations of sensitizers must be left on longer and observed for at least 5 days after the patches are removed. A reaction not present when the patch is removed but which becomes manifest less than 5 days after the patch is applied is considered a delayed reaction. The delayed reaction indicates that a low degree of specific sensitivity is present or that a weak concentration of the sensitizer was used. To report a

patch test reaction properly there should be given (1) concentration of the chemical tested; (2) amount of the chemical used; (3) area of skin contacted; (4) site of application; (5) number of days patch test was left on; (6) periods after removal of the patch that the readings were made. In this way a more comprehensive appraisal of the reaction in terms of the degree of sensitivity can be made.

The true allergic reaction as a rule increases rather than decreases in intensity for 24 to 48 hours after the patch test is removed. Reactions of primary irritation with few exceptions tend to subside after the removal of the irritant.

The evaluation of a weakly positive reaction (1+) depends a great deal on the experience of the one making the patch test. In dealing with a fabric or other substance containing a weak concentration of a sensitizer, a 1+ or 2+ reaction is very significant. This is especially true in industry where dermatitis may not only be due to contact with the sensitizer in low concentration but there may be the added factor of friction, with exposure to large amounts of the chemical which is not present in the patch test.

A positive reaction which cannot be reproduced later with the same technique indicates that at the time the patch test was performed the patient was sensitive to the concentration and quantity of the chemical applied. A 1+ reaction which does not persist for 24 hours is probably a false positive or is caused by a mild primary irritant.

A negative patch test does not necessarily rule out the test substance as a causative agent. The negative reaction might be due to one of three causes: (1) Under the condition of the patch test the actual mechanism which produces the dermatitis is lacking, i.e., patch test does not equal working conditions; (2) the patient is no longer sensitive; (3) the actual sensitizer was not applied.

PROPHETIC PATCH TEST

The use of the patch test for the purpose of foretelling whether a substance will or will not produce dermatitis is a recent development and may be called the "prophetic patch test." It was introduced by one of the authors to determine possible irritant qualities of new chemicals used in the manufacture of wearing apparel (*8*), cosmetics, or other articles coming in contact with the skin. The patch test is made on 200 or more individuals in the usual way. Since the chemicals or compounds to be tested are new ones, it is presumed that there has been no previous contact with them.

Two series of patch tests are carried out on the same individuals 10 to 14 days apart. The first series of tests would give reactions only with a primary irritant, or with people who have been sensitized by previous contact with the chemical. The second series shows the

number sensitized by the first series. Experience has shown that even one positive reaction among the second series may indicate that the test substance is a sensitizer which might lead to outbreaks of dermatitis if allowed to be used by large groups of people.

WHEN AND WHERE TO PERFORM PATCH TESTS

The impression seems widespread that patch tests should not be performed while an eruption is still present because a flare-up of the dermatitis might take place. The period most favorable to a positive reaction is at the time when the dermatitis is still present and active. A relative hyposensitivity may develop when the dermatitis is disappearing, or after it has disappeared, with the result that the patch test would tend to be negative. Here, too, experience and judgment are necessary in choosing the proper time for performing the tests. Obviously when dealing with a patient who has a generalized dermatitis it is better either to wait until the eruption has improved or, if the test is carried out while the eruption is present, to use a low concentration of the suspected chemical.

A generalized eruption following the patch test indicates a high degree of sensitivity. Such eruptions are exceedingly rare. Flare-ups of quiescent eruptions are not uncommon following patch tests. These also indicate high degrees of sensitivity.

In cases of true allergic dermatitis, the skin all over the body is sensitive and patch tests can be applied at any convenient site. The most rapid reaction, all other factors being equal, will take place on the areas of skin where the keratin is thinnest. The thick keratin layer of the palms and soles not only explains the negative patch test which results at these sites but is the main reason why contact dermatitis is rarely seen in these locations.

COMPLICATIONS OF PATCH TESTS

Unless inadvertently a patch test is made with a primary irritant, even strongly positive reactions do not leave a scar. In the presence of marked hypersensitivity, patch testing with a fairly high concentration of the allergen may produce a skin reaction which spreads beyond the area of application of the patch or may even elicit a generalized reaction. This may manifest itself as a flare-up of existing lesions, reappearance of lesions which have already faded, or the appearance of a generalized eruption. Such a complication may even occur when a standard concentration of the sensitizing chemical is used for the patch test, although this is rare. Toxic symptoms from absorption of the test material are unlikely because of the small amounts of chemical used and the relatively small area of skin through which absorption is possible. However, rare instances have been

reported, and systemic symptoms such as a rise in temperature, adenopathy, and pain have sometimes occurred after patch testing.

MEDICO-LEGAL ASPECTS

Downing (*9*) has reported instances of lawsuits and claims due to harmful effects resulting from the use of patch tests. However, if the tests are properly carried out by a qualified physician possessing training and necessary knowledge, they should be no more open to criticism and lawsuits than any other diagnostic procedure performed by the physician.

Patch tests are of established value in finding the etiologic agents in dermatitis venenata and dermatitis medicamentosa, and are accepted by many insurance companies and compensation boards as necessary steps in establishing a causal relationship.

Patch tests should not be performed with allergens with which the patient has not already come in contact and which he may encounter later in the course of his daily life, because of the possibility of inducing a hypersensitivity (with a resultant dermatitis when he comes in contact with the allergen).

PROVOCATIVE PATCH TEST

When patch testing with a dilute concentration of allergens such as are found in fabrics, the reaction in some cases may be negative even though from the history and by actual exposure the allergen seems to be the precipitating cause. If, however, at the same time the test is performed with the dilute concentration a second patch of a strong concentration is applied, positive reactions will develop at both sites if the actual allergen has been used. This phenomenon has been called the "provocative patch test" by the authors.

PATCH TEST WITH VARIOUS SUBSTANCES

Fabrics.—Though dermatitis from fabrics is usually an allergic contact dermatitis, primary irritants, such as antimildews, impregnated into fabrics have been encountered occasionally. The allergen may be the dye (rarely), the fabric itself, or the finish containing an antimildew, an antiseptic, an antiwrinkle, or a waterproofing compound.

A piece of the fabric about 1 inch square may be left on for 2 to 5 days. The reaction should be read up to 3 days after the removal of the patch. Best results are obtained while the dermatitis is still present. If the result is positive, the substances incorporated in the material can be ascertained from the manufacturer and tests performed with the various chemicals. If this is not possible, various steps can be taken to determine to some extent the class of allergens involved.

Soak the fabric in warm, slightly acid water for 24 hours to see if the

dye bleeds. If it does, the water extract can be concentrated in vacuo and then a patch test can be made with the concentrated dye.

To remove the finish, soak the fabric in ether for a few hours, allow the ether extract to evaporate on a watch crystal, and test with the residue.

If possible, perform a patch test with the grey goods, i.e., cloth before any dye or finish is applied. This is important to pick up the rare cases of sensitivity to wool, cotton, or silks. At the same time as the patch test for the cloth itself is performed, it may be necessary to carry out a provocative test as described above.

Furs.—In patch testing with fur, the test should be carried out with the hairy side of the fur. If it is positive, rub the fur vigorously with a piece of gauze and should the gauze become discolored, the fur is so-called "dirty fur." A patch test should then be carried out with the gauze discolored by the dye. While most cases of fur dermatitis are due to dye, a dermatitis due to fur itself may be found occasionally.

Leather.—Dermatitis among leather workers is rather frequent since many primary irritants are used in processing the leather, in the removal of the hair from the hide, in the tanning process, and in leather dyeing. Dermatitis has also been reported frequently from the wearing of leather wristwatch straps, hat bands, and gloves. The most frequent causes of dermatitis among the wearers were the dyes and tanning agents. These chemicals may be dissolved out of the leather by water or perspiration and cause dermatitis in sensitive individuals. However, the number of individuals affected is small compared to the millions of users.

The first step in carrying out the patch test is to determine whether the leather is real or artificial. This can often be determined by tearing the leather. To test the leather, moisten a piece about ½-inch square with the patient's own perspiration from the axilla or with a solution approximating the sweat in pH, and patch test in the usual way. A positive patch test indicates a sensitivity to something in the leather.

To determine whether the dye is the cause of the dermatitis, soak a piece of the suspected material in water having the same pH as perspiration. The material is left in the solution for about an hour and if the solution is dissolved it is said to "bleed." Evaporate in vacuo and patch test with concentrated dye. If this reaction is negative the previously positive reaction indicates that there is a sensitivity to the tanning agents or other chemicals, which are not easily dissolved out with water.

To test the finishing oils or fats as possible causes of dermatitis, soak the leather in ether for 15 minutes, pour off the ether into a

water glass, evaporate to dryness, smear a piece of gauze with the fatty deposit, and apply to the skin.

The other chemicals in the leather can be traced by patch testing with the leather in different stages of manufacture.

If the leather is artificial the celluloid, plasticizer, dye, or synthetic resin may be dissolved out by a solvent and used for patch tests.

Shoes.—In investigating suspected cases of dermatitis due to footwear, it is useless to patch test with the material on the outside of the shoe. It is difficult to conceive how contact between the skin of the foot and the outer surface of the leather could take place through the leather, the backing, interlining, and the stocking. Dermatitis from shoe polish can occur on the hands of the bootblack but not on the foot of the wearer of the shoes.

The backing in the shoes has in it adhesive, antimildews, fungicides, and other chemicals which are sensitizers. In investigating a shoe dermatitis patch tests should be made with the backing. In some instances the leather on the inside of the shoe, such as the tongue, the inner sole, and the sock lining, may be the cause of the dermatitis, but not the outside leather. The material which causes the dermatitis must get through the sock or the stocking. Therefore, it is worth while to patch test with the sock or stocking (before washing) which should contain the eliciting agent.

Rubber.—Dermatitis due to natural rubber is more frequent among those coming in contact with Pará rubber than those working with sheet rubber, because in the process of coagulating and curing the latex there are more of the products of combustion in the former. Crepe rubber is not smoked and causes very little dermatitis.

Rubber must be vulcanized or cured to make it serviceable. Various chemicals are used in this process. In order to accelerate the vulcanization, chemicals called accelerators are used. There are also incorporated chemicals known as antioxidants to prevent decomposition or oxidization of the rubber. It is the antioxidants and accelerators which are the chief causes of dermatitis. To determine the actual cause of dermatitis due to rubber, patch tests should be done with rubber, the antioxidants, accelerators, and other compounds.

In patch testing with sponge rubber, care must be taken to test with both the spongy and smooth surfaces, as in many instances there are differences in reactions obtained from these surfaces.

The dermatitis due to dress shields is often caused by the rubber which they contain; the active irritant is usually the chemical formed on the surface as a result of the acid or vapor cure.

Cosmetics.—Before placing a new formula on the market, closed patch tests should be performed by a competent dermatologist on at least 200 subjects with the new formula, using as a control an old formula which has been on the market for years and which has caused

no unusual number of complaints. The closed patches should remain on for 48 hours, after which the reactions should be read each day for 3 days in order to observe late reactions. The number of reactions obtained from the new formula should not exceed the number obtained from the old.

Ten days after the last reading of the reactions new closed patches of both new and old formulas should be applied on the same 200 subjects and allowed to remain for 48 hours, and the reactions again read each day for 3 days after removal of the patches. If the number of subjects showing sensitization reactions from the new formula exceeds the number showing sensitization reactions from the old formula, the formula is unsafe. These tests will give an idea of the relative skin-irritating and sensitizing properties of the new formulas as compared with the old one but do not give an accurate idea of what may happen under conditions of actual use. Therefore, the following additional tests should be performed:

The same 200 people should actually use the old and the new cosmetics each day on opposite sides of the body for a period of 4 weeks If no cases of dermatitis result from the new formula it is safe to place on trial sale. If only one case results, then another group of 200 people should be subjected to the actual-use test. If no cases of dermatitis result among these, it is safe to place the cosmetic on trial sale. If more than one case of dermatitis occurs among the first 200 subjects after 4 weeks of actual use the cosmetic is unsafe.

By trial sale is meant the sale for a period of not less than 1 month (if no cases of dermatitis are reported before this time) in only one community where between 5, 000 and 10, 000 packages of the cosmetic are to be sold. If no cases of dermatitis are reported during the trial sale then the cosmetic is safe. If cases are reported during the trial sale the manufacturer should employ a competent dermatologist to investigate and determine the actual cause. The continued sale of the cosmetic or its withdrawal from the market should depend on such an investigation.

In trying to ascertain whether a cosmetic is the cause of dermatitis, it is better to apply the cosmetic daily to the same test site of skin for at least 4 days in the manner in which the cosmetic is actually used, rather than in the form of a patch test. This is because cosmetics when used are not covered and usually a large part of the substance disappears from the skin by evaporation. Covered patch tests do not permit such evaporation and many cosmetics which are harmless in actual use may give positive patch tests when applied in the form of a covered patch.

In performing patch tests with cosmetics which may contain photosensitizing materials such as lipstick and dyes, the test should be performed on uncovered portions of the body such as the wrist, the V of

the neck, etc., because the photosensitization is only manifest on parts which are exposed to light

REFERENCES

(1) Jadassohn, J.: Text-Book, Dermatologie. P. 66. Weidmann & Co., Vienna. Bern, 1938.
(2) Rokstad, Ingvold: Patch test, new modification of (the chamber method). Arch. Dermat. and Syph., 41: 649–653 (April 1940).
(3) Grolnick, M. J.: Studies in contact dermatitis. J. Allergy, 7: 341 (1936).
(4) Guild, B. T.: Window patch test. Arch. Dermat. and Syph., 39: 807 (May 1939).
(5) Wedroff, N.: Die Tropfmethode zur Prüfung der Überempfindlichkert der Haut gegen chemische Stoffe. Arch. f. Dermat. u. Syph., 167: 225–232 (1933)
(6) Hansen, P.: Einige Untersuchungen über die Einwerkung der Seife auf der Haut. Acta dermat-veneral., 17: 589 (1936). Sulzberger, M. B., and Wise, F.: The contact or patch test in dermatology: Its uses, advantages, and limitations. Arch. Dermat. and Syph., 23: 519 (March 1931).
(7) Schwartz, Louis. Dermatitis venenata from Brazilian walnut wood. Pub. Health Rep., 46: 1938–1943 (Aug. 14, 1931).
(8) Schwartz, Louis: Dermatitis from new synthetic resin fabric finishes. J. Invest. Dermatol., 4: 459-470 (December 1941).
(9) Downing, J. G.: Legal aspects of patch tests. Arch. Dermat. and Syph., 44: 63 (July 1941).

INCIDENCE OF HOSPITALIZATION, MARCH 1944

Through the cooperation of the Hospital Service Plan Commission of the American Hospital Association, data on hospital admissions among about 10,000,000 members of Blue Cross Hospital Service Plans are presented monthly. These plans provide prepaid hospital service. The data cover about 60 hospital service plans scattered throughout the country, mostly in large cities.

Item	March 1943	March 1944
1. Number of plans supplying data	64	68
2. Number of persons eligible for hospital care	9,281,942	11,605,270
3. Number of persons admitted for hospital care	79,699	98,151
4. Incidence per 1,000 persons, annual rate, during current month (daily rate × 365)	101.0	99.5
5. Incidence per 1,000 persons, annual rate for the 12 months ended March 31	107.0	104.6

DEATHS DURING WEEK ENDED APRIL 15, 1944

[From the Weekly Mortality Index, issued by the Bureau of the Census, Department of Commerce]

	Week ended Apr. 15, 1944	Corresponding week, 1943
Data for 92 large cities of the United States:		
Total deaths	9,558	9,836
Average for 3 prior years	9,216	
Total deaths, first 15 weeks of year	150,771	151,699
Deaths under 1 year of age	699	625
Average for 3 prior years	607	
Deaths under 1 year of age, first 15 weeks of year	9,494	10,610
Data from industrial insurance companies:		
Policies in force	66,388,406	66,503,260
Number of death claims	13,668	12,628
Death claims per 1,000 policies in force, annual rate	10.8	9.9
Death claims per 1,000 policies, first 15 weeks of year, annual rate	11.2	10.7

PREVALENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED APRIL 22, 1944

Summary

After a decline in each of the 4 preceding weeks, the incidence of meningococcus meningitis increased during the current week. A total of 491 cases was reported, as compared with 466 for the preceding week and a 5-year (1939–43) median of 55 cases. Increases were recorded in 5 of the 9 geographic areas, namely, the New England, Middle Atlantic, East North Central, South Atlantic, and West South Central divisions, although decreases were recorded in some States in these areas. Ten States reporting 18 or more cases each for the current week (last week's figures in parentheses) are as follows: *Increases*—New York 56 (40), New Jersey 23 (18), Ohio 35 (22), Illinois 53 (42), North Carolina 20 (9), South Carolina 18 (1), Louisiana 18 (8), Texas 23 (12); *decreases*—California 23 (40); *no change*—Pennsylvania 33 (33). The cumulative figure for the year to date is 8,634 cases, as compared with 7,621 for the same period last year and a 5-year median of 814.

A slight increase occurred during the week in the incidence of measles, while a decline was recorded for that of scarlet fever. Totals reported are 30,935 for measles and 6,807 for scarlet fever, as compared with 5-year medians of 24,725 and 4,031 respectively. The totals for the year to date are approximately 43 percent and 54 percent above the respective 5-year medians.

Current totals reported for diphtheria, influenza, smallpox, typhoid fever, and whooping cough are lower in each instance than for the corresponding week in any of the past 5 years. A total of 26 cases of poliomyelitis was reported, as compared with 20 cases last week, 23 for the corresponding week of last year, and a 5-year median of 16.

A total of 9,288 deaths was recorded for the week in 93 large cities of the United States, as compared with 9,572 last week and a 3-year (1941–43) average of 8,755. The total for the year to date is 160,440, as compared with 161,465 for the same period last year.

Telegraphic morbidity reports from State health officers for the week ended April 22, 1944, and comparison with corresponding week of 1943 and 5-year median

In these tables a zero indicates a definite report, while leaders imply that, although none was reported, cases may have occurred.

Division and State	Diphtheria			Influenza			Measles			Meningitis, meningococcus		
	Week ended		Median 1939–43	Week ended		Median 1939–43	Week ended		Median 1939–43	Week ended		Median 1939–43
	Apr. 22, 1944	Apr. 24, 1943		Apr. 22, 1944	Apr. 24, 1943		Apr. 22, 1944	Apr. 24, 1943		Apr. 22, 1944	Apr. 24, 1943	
NEW ENGLAND												
Maine	0	2	2	5	------	------	0	2	135	3	10	0
New Hampshire	0	0	0	------	1	------	123	23	23	1	1	0
Vermont	0	0	0	------	------	------	118	347	73	0	1	0
Massachusetts	4	1	2	------	------	------	817	1,524	884	15	27	2
Rhode Island	1	2	0	44	1	------	140	24	49	2	14	0
Connecticut	1	------	1	------	2	2	622	447	447	9	11	0
MIDDLE ATLANTIC												
New York	16	18	18	[1] 2	[1] 30	[1] 16	2,314	3,066	1,782	56	76	8
New Jersey	5	2	9	7	9	9	1,667	1,545	663	23	23	1
Pennsylvania	4	11	11	6	1	------	966	1,765	1,419	33	29	7
EAST NORTH CENTRAL												
Ohio	1	9	7	7	20	16	1,087	1,084	342	35	6	2
Indiana	4	6	6	6	21	21	256	572	171	2	14	0
Illinois	8	19	19	15	9	21	1,139	1,414	601	53	22	2
Michigan [2]	8	2	4	3	61	7	944	2,878	671	15	38	6
Wisconsin	1	1	0	37	24	62	2,821	1,620	1,020	10	6	1
WEST NORTH CENTRAL												
Minnesota	8	0	1	1	1	2	983	285	285	6	8	0
Iowa	1	6	3	2	6	8	191	336	290	2	1	0
Missouri	0	0	4	1	4	4	375	415	415	15	14	1
North Dakota	1	1	1	52	------	6	120	70	32	3	0	0
South Dakota	1	0	0	------	------	------	15	68	13	0	0	0
Nebraska	3	0	2	5	------	5	198	198	198	1	3	0
Kansas	1	3	3	------	11	11	432	576	638	2	6	0
SOUTH ATLANTIC												
Delaware	1	0	0	------	------	------	15	331	5	0	1	0
Maryland [2]	10	1	2	2	3	6	895	107	378	10	20	4
District of Columbia	0	1	1	3	3	3	238	78	112	3	2	1
Virginia	6	3	7	111	284	284	903	425	425	13	24	3
West Virginia	3	1	2	21	11	42	431	176	176	4	2	2
North Carolina	6	7	8	40	6	6	1,305	191	761	20	15	2
South Carolina	4	3	4	288	385	416	552	372	143	18	11	1
Georgia	3	7	7	5	63	63	65	238	201	5	2	1
Florida	1	6	2	23	9	8	301	82	171	14	8	0
EAST SOUTH CENTRAL												
Kentucky	6	4	4	24	16	16	198	334	77	6	26	2
Tennessee	7	3	3	40	86	86	219	381	154	13	15	2
Alabama	5	0	5	95	114	148	351	288	143	9	15	4
Mississippi	5	7	7	------	------	------	------	------	------	6	6	1
WEST SOUTH CENTRAL												
Arkansas	4	4	4	70	19	95	254	131	83	3	20	0
Louisiana	1	2	3	8	2	9	116	197	184	18	9	1
Oklahoma	3	6	5	65	43	156	324	43	106	2	1	0
Texas	27	17	18	562	868	555	3,636	611	1,140	23	3	3
MOUNTAIN												
Montana	1	2	1	------	2	4	132	251	127	0	1	0
Idaho	1	10	0	------	3	1	62	87	87	1	6	0
Wyoming	0	0	0	------	23	------	100	153	54	0	3	0
Colorado	2	5	7	19	26	26	511	738	366	1	5	0
New Mexico	0	0	2	3	5	2	229	16	41	0	1	1
Arizona	3	0	2	57	68	84	273	64	104	0	4	0
Utah [3]	0	1	0	24	2	10	37	228	228	2	5	0
Nevada	0	0	0	100	------	------	1	0	0	0	0	0
PACIFIC												
Washington	1	3	1	1	2	------	262	393	393	7	5	1
Oregon	9	2	2	18	17	17	120	346	346	4	6	0
California	18	20	16	43	78	78	4,077	842	842	23	48	2
Total	195	198	219	1,815	2,339	2,839	30,935	25,362	24,725	491	569	55
16 weeks	3,783	4,340	4,687	326,447	66,304	134,670	398,573	288,308	279,676	8,634	7,621	814

See footnotes at end of table.

Telegraphic morbidity reports from State health officers for the week ended April 22, 1944, and comparison with corresponding week of 1943 and 5-year median—Con.

Division and State	Poliomyelitis			Scarlet fever			Smallpox			Typhoid and paratyphoid fever [3]		
	Week ended—		Median 1939–43	Week ended—		Median 1939–43	Week ended—		Median 1939–43	Week ended—		Median 1939–43
	Apr. 22, 1944	Apr. 24, 1943		Apr. 22, 1944	Apr. 24, 1943		Apr. 22, 1944	Apr. 24, 1943		Apr. 22, 1944	Apr. 24, 1943	
NEW ENGLAND												
Maine	0	0	0	55	8	9	0	0	0	1	0	0
New Hampshire	0	0	0	15	13	10	0	0	0	1	2	0
Vermont	0	0	0	13	12	12	0	0	0	0	0	0
Massachusetts	0	2	0	386	588	181	0	0	0	2	5	0
Rhode Island	0	0	0	27	25	19	0	0	0	0	0	0
Connecticut	0	0	0	88	139	94	0	0	0	0	1	1
MIDDLE ATLANTIC												
New York	0	1	1	569	643	531	0	0	0	6	5	5
New Jersey	1	0	0	231	148	156	0	0	0	2	2	2
Pennsylvania	1	0	0	664	321	379	0	0	0	4	8	8
EAST NORTH CENTRAL												
Ohio	0	0	0	434	228	258	0	23	0	1	4	3
Indiana	0	0	0	190	89	154	0	0	1	0	0	9
Illinois	1	0	0	571	166	413	1	0	1	0	1	4
Michigan [2]	0	0	0	334	133	323	0	0	3	0	5	3
Wisconsin	0	0	0	329	380	162	0	0	5	0	0	0
WEST NORTH CENTRAL												
Minnesota	0	0	0	206	63	63	0	0	3	1	0	0
Iowa	0	0	0	195	53	53	1	0	1	1	2	0
Missouri	1	1	0	191	116	91	0	0	1	1	2	2
North Dakota	0	0	0	38	3	7	0	0	1	0	0	0
South Dakota	0	6	0	38	14	19	0	0	0	0	1	0
Nebraska	0	0	0	87	36	16	0	0	0	0	0	0
Kansas	0	0	0	95	49	50	0	1	1	2	1	1
SOUTH ATLANTIC												
Delaware	0	0	0	22	4	10	0	0	0	0	0	0
Maryland [3]	0	0	0	250	74	50	0	0	0	1	2	1
District of Columbia	0	0	0	137	20	15	0	0	0	0	0	0
Virginia	0	0	0	130	39	33	0	0	0	1	4	1
West Virginia	1	2	1	110	23	29	0	0	0	9	8	3
North Carolina	2	0	0	42	38	20	0	0	0	2	1	1
South Carolina	0	0	2	10	4	4	1	0	0	0	1	1
Georgia	0	0	0	11	11	11	0	0	0	5	1	2
Florida	1	0	1	11	7	5	0	0	0	[3] 1	3	4
EAST SOUTH CENTRAL												
Kentucky	1	1	1	99	47	71	0	0	0	2	0	2
Tennessee	0	1	0	106	58	58	0	0	0	2	0	2
Alabama	1	0	0	12	13	10	0	0	0	0	0	2
Mississippi	0	1	1	3	9	7	0	0	1	0	4	2
WEST SOUTH CENTRAL												
Arkansas	1	1	0	0	4	4	0	1	1	0	1	1
Louisiana	1	0	0	9	6	6	0	0	0	4	4	4
Oklahoma	2	1	1	2	19	16	0	0	0	0	2	2
Texas	2	3	2	71	46	36	1	1	3	9	5	6
MOUNTAIN												
Montana	1	0	0	41	6	22	0	0	0	0	0	0
Idaho	0	0	0	34	28	4	0	0	0	0	0	0
Wyoming	0	0	0	8	70	9	0	0	0	1	0	0
Colorado	1	0	0	79	52	36	0	0	0	0	1	0
New Mexico	0	0	0	19	9	9	0	0	0	3	0	1
Arizona	0	3	0	39	10	5	1	0	0	1	0	0
Utah [3]	0	1	0	72	30	16	0	0	0	0	1	0
Nevada	0	0	0	0	0	0	0	0	0	0	0	0
PACIFIC												
Washington	4	0	0	325	35	35	0	1	0	0	0	1
Oregon	0	0	0	139	24	11	0	2	2	3	0	0
California	4	5	1	270	118	118	0	0	0	2	3	3
Total	26	23	16	6,807	4,031	4,031	5	29	36	68	80	90
16 weeks	357	401	384	98,157	63,798	63,798	189	424	706	[3] 1,146	882	1,216

See footnotes at end of table.

Telegraphic morbidity reports from State health officers for the week ended April 22, 1944, and comparison with corresponding week of 1943 and 5-year median—Con.

Division and State	Whooping cough			Week ended Apr. 22, 1944								
	Week ended		Median 1939–43	Anthrax	Dysentery			Encephalitis, infectious	Leprosy	Rocky Mt. spotted fever	Tularemia	Typhus fever
	Apr. 22, 1944	Apr. 24, 1943			Amebic	Bacillary	Unspecified					
NEW ENGLAND												
Maine	24	25	25	0	0	0	0	0	0	0	0	0
New Hampshire	0	11	6	0	0	0	0	1	0	0	0	0
Vermont	2	11	23	0	0	0	0	0	0	0	0	0
Massachusetts	65	114	151	0	0	0	0	1	0	0	0	0
Rhode Island	2	34	16	0	0	0	0	0	0	0	0	0
Connecticut	24	29	44	0	0	0	0	0	0	0	0	0
MIDDLE ATLANTIC												
New York	164	253	369	0	1	19	0	4	0	0	0	0
New Jersey	20	117	117	1	6	0	0	1	0	0	0	0
Pennsylvania	52	231	273	0	0	0	0	1	0	0	0	1
EAST NORTH CENTRAL												
Ohio	66	99	148	0	1	0	0	0	0	0	0	0
Indiana	7	93	55	0	1	0	15	0	0	0	0	0
Illinois	26	104	104	0	2	2	0	4	0	0	0	0
Michigan [3]	80	319	215	0	0	1	0	0	0	0	0	0
Wisconsin	24	213	154	0	0	0	0	1	0	0	0	0
WEST NORTH CENTRAL												
Minnesota	29	58	48	0	2	0	0	0	0	0	0	0
Iowa	8	48	32	0	0	0	0	0	0	0	0	0
Missouri	10	26	22	0	0	0	1	0	0	0	0	0
North Dakota	0	6	6	0	0	0	0	0	0	0	0	0
South Dakota	2	4	4	0	0	0	0	0	0	0	0	0
Nebraska	21	6	6	0	0	0	0	0	0	0	0	0
Kansas	12	97	33	0	1	0	0	0	0	0	0	0
SOUTH ATLANTIC												
Delaware	0	1	2	0	0	0	0	0	0	0	0	0
Maryland [2]	18	91	81	0	0	0	2	0	0	0	0	0
District of Columbia	2	17	13	0	0	0	0	0	0	0	0	0
Virginia	30	76	84	0	0	0	17	1	0	0	0	0
West Virginia	26	75	38	0	0	0	0	0	0	0	0	0
North Carolina	139	162	162	0	2	0	0	0	0	0	0	0
South Carolina	135	44	62	0	0	10	0	0	0	0	1	2
Georgia	6	126	29	0	0	2	0	0	0	0	4	4
Florida	46	13	14	0	3	4	0	0	0	0	0	2
EAST SOUTH CENTRAL												
Kentucky	58	36	80	0	0	0	0	0	0	0	0	0
Tennessee	7	59	33	0	1	0	0	0	0	0	0	1
Alabama	16	88	34	0	0	0	0	0	0	0	1	3
Mississippi	------	------	------	0	0	0	0	0	0	0	5	2
WEST SOUTH CENTRAL												
Arkansas	4	28	11	0	0	1	0	0	0	0	1	1
Louisiana	0	5	9	0	2	0	0	0	0	0	1	1
Oklahoma	14	20	20	0	0	0	0	0	0	0	0	0
Texas	231	701	229	0	11	208	0	1	0	0	0	18
MOUNTAIN												
Montana	4	18	6	0	0	0	0	0	0	0	0	0
Idaho	8	3	3	0	0	0	0	0	0	2	0	0
Wyoming	5	13	4	0	0	0	0	0	0	0	0	0
Colorado	102	34	34	0	1	5	0	0	0	0	0	0
New Mexico	6	19	20	0	0	0	1	0	0	0	0	0
Arizona	16	13	24	0	0	0	29	1	0	0	0	0
Utah [2]	47	81	73	0	0	0	0	0	0	0	0	0
Nevada	0	0	0	0	0	0	0	0	0	0	0	0
PACIFIC												
Washington	50	22	67	0	0	0	0	0	0	0	0	0
Oregon	12	13	30	0	0	0	0	0	0	0	0	0
California	98	319	354	0	0	6	0	1	0	0	0	0
Total	1,718	3,975	3,749	1	34	258	65	17	0	2	13	35
16 weeks	28,914	64,183	64,183	17	428	3,345	1,023	168	9	7	163	604
16 weeks, 1943	------	------	------	23	472	3,119	729	176	8	17	269	756

[1] New York City only. [2] Period ended earlier than Saturday.

[3] Including paratyphoid fever cases reported separately, as follows: New York, 1; Georgia, 1; Florida, 1 (later information: Week ended Mar. 25, no case of paratyphoid fever, instead of 1 as previously reported); Arizona, 1.

WEEKLY REPORTS FROM CITIES

City reports for week ended April 8, 1944

This table lists the reports from 86 cities of more than 10,000 population distributed throughout the United States, and represents a cross section of the current urban incidence of the diseases included in the table.

	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
NEW ENGLAND												
Maine:												
Portland	0	------	------	0	34	0	1	0	7	0	0	0
New Hampshire:												
Concord	0	0	------	0	5	0	0	0	0	0	0	0
Massachusetts:												
Boston	2	0	------	0	114	13	21	0	108	0	1	18
Fall River	0	0	------	0	13	0	3	0	2	0	0	2
Springfield	0	0	------	0	36	0	1	0	55	0	0	13
Worcester	0	0	------	0	2	1	8	0	70	0	0	8
Rhode Island:												
Providence	0	0	1	0	166	1	4	0	8	0	0	3
Connecticut:												
Bridgeport	0	0	1	1	47	0	3	0	3	0	0	1
Hartford	0	0	------	0	6	3	2	0	22	0	0	0
New Haven	0	0	------	0	64	0	4	0	0	0	0	0
MIDDLE ATLANTIC												
New York:												
Buffalo	0	0	------	2	2	0	6	0	18	0	0	0
New York	11	0	5	3	1,718	38	81	1	370	0	3	27
Rochester	0	0	------	0	6	0	5	0	2	0	0	4
Syracuse	0	0	------	0	4	1	2	0	8	0	0	0
New Jersey:												0
Camden	0	0	------	1	6	0	4	0	51	0	0	0
Newark	0	0	4	2	214	4	5	0	39	0	0	4
Trenton	0	0	------	0	4	1	0	0	6	0	0	0
Pennsylvania:												
Philadelphia	3	0	3	0	47	12	23	0	100	0	0	10
Pittsburgh	0	0	2	2	21	8	18	0	25	0	0	1
Reading	0	0	------	0	1	0	2	0	2	0	0	2
EAST NORTH CENTRAL												
Ohio:												
Cincinnati	0	0	1	0	35	8	2	0	44	0	0	1
Cleveland	0	0	4	2	234	9	14	0	104	0	0	5
Columbus	0	0	1	1	118	2	2	0	5	0	0	7
Indiana:												
Fort Wayne	0	0	------	0	1	0	3	0	2	0	0	0
Indianapolis	3	0	------	4	49	1	8	0	60	0	0	0
South Bend	0	0	------	0	1	0	0	0	2	0	0	1
Terre Haute	1	0	------	0	6	0	0	0	2	0	0	0
Illinois:												
Chicago	0	0	------	0	145	28	30	0	196	0	0	10
Springfield	0	0	------	0	48	1	3	0	4	0	0	0
Michigan:												
Detroit	3	0	1	0	112	15	12	0	148	0	1	21
Flint	0	0	------	0	9	2	3	0	2	0	0	4
Grand Rapids	0	0	------	1	95	1	0	0	11	0	0	0
Wisconsin:												
Kenosha	0	0	------	0	97	0	0	0	5	0	0	0
Milwaukee	1	1	------	0	208	1	4	0	70	0	0	4
Racine	0	0	------	0	23	0	1	0	1	0	0	5
Superior	0	0	------	0	2	0	0	0	36	0	0	1
WEST NORTH CENTRAL												
Minnesota:												
Duluth	0	0	------	0	32	0	4	0	23	0	0	4
Minneapolis	0	0	------	0	166	1	7	0	36	0	0	2
St. Paul	0	0	------	0	452	1	13	0	28	0	0	3
Missouri:												
Kansas City	2	0	------	1	70	3	7	0	67	0	0	3
St. Joseph	0	0	------	0	0	1	0	0	7	0	0	0
St. Louis	0	0	1	1	137	12	7	0	49	0	0	3
North Dakota:												
Fargo	0	0	------	0	2	0	0	0	3	0	0	0
Nebraska:												
Omaha	2	0	------	0	32	0	3	0	35	0	0	0
Kansas:												
Topeka	0	0	------	0	37	0	3	0	4	0	0	1
Wichita	0	0	------	0	52	0	5	0	14	0	0	0

City reports for week ended April 8, 1944—Continued

	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
SOUTH ATLANTIC												
Delaware:												
Wilmington	1	0		0	5	1	2	0	1	0	0	0
Maryland:												
Baltimore	5	0	7	1	730	7	13	0	104	0	0	34
Cumberland	0	0		0	0	0	0	0	0	0	0	0
Frederick	0	0		0	6	0	1	0	3	0	0	0
District of Columbia:												
Washington	0	0		0	155	0	11	0	149	0	0	5
Virginia:												
Lynchburg	0	0		0	2	0	2	0	0	0	0	4
Richmond	0	0	1	1	122	3	1	1	5	0	1	1
Roanoke	0	0		0	39	0	1	0	0	0	0	9
West Virginia:												
Charleston	0	0		0	2	0	0	0	14	0	0	0
Wheeling	0	1		0	46	0	2	0	13	0	0	1
North Carolina:												
Winston-Salem	0	0		0	35	0	0	0	2	0	0	2
South Carolina:												
Charleston	0	0	19	0	10	0	1	0	2	0	0	0
Georgia:												
Atlanta	0	1	5	0	17	1	4	0	9	0	0	0
Brunswick	0	0		0	3	2	0	0	0	0	0	0
Savannah	0	0	3	3	4	0	1	0	0	0	0	0
Florida:												
Tampa	0	0	1	0	4	1	2	0	2	0	0	0
EAST SOUTH CENTRAL												
Tennessee:												
Memphis	0	0	3	1	28	5	3	0	7	0	0	3
Nashville	0	0		1	20	0	3	0	8	0	0	0
Alabama:												
Birmingham	0	0	1	1	6	0	6	0	3	0	0	0
Mobile	0	0		1	4	1	2	0	0	0	0	0
WEST SOUTH CENTRAL												
Arkansas:												
Little Rock	0	0		0	5	0	0	0	0	0	0	1
Louisiana:												
New Orleans	3	0	4	2	41	5	3	2	6	0	2	0
Texas:												
Dallas	0	0		0	175	0	4	0	3	0	0	2
Galveston	0	0		0	2	1	0	0	1	0	0	0
Houston	0	0		0	23	1	4	0	3	0	0	0
San Antonio	1	0		0	24	3	3	0	1	0	1	0
MOUNTAIN												
Montana:												
Billings	0	0		0	8	0	0	0	0	0	0	1
Great Falls	0	0		0	14	0	0	0	12	0	0	0
Helena	0	0		0	1	0	0	0	1	0	0	0
Missoula	0	0		0	0	0	0	0	2	0	0	0
Idaho:												
Boise	0	0	2	0	10	0	0	0	3	0	0	0
Colorado:												
Denver	1	0	2	0	92	1	6	0	25	0	0	10
Pueblo	1	0		0	30	0	0	0	3	0	0	0
Utah:												
Salt Lake City	0	0		0	11	0	1	0	32	0	0	1
PACIFIC												
Washington:												
Seattle	1	0		1	51	0	6	0	62	0	0	2
Spokane	0	0	2	2	60	0	1	0	16	0	0	2
Tacoma	0	0		0	21	0	2	0	52	0	0	0

City reports for week ended April 8, 1944—Continued

	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
PACIFIC—continued												
California:												
Los Angeles	12	0	8	2	293	8	4	1	31	0	1	2
Sacramento	0	0	------	0	19	1	3	0	4	0	0	7
San Francisco	0	0	5	0	158	2	7	0	63	0	0	6
Total	53	3	87	37	6,947	206	423	5	2,496	0	7	261
Corresponding week, 1943	70	5	121	43	7,856	196	478	2	1,710	1	13	1,135
Average, 1939–43	74	------	255	[1] 39	[2] 5,746	------	[1] 464	------	1,563	6	16	1,102

[1] 3-year average, 1941–43. [2] 5-year median.

Dysentery, amebic.—Cases: New York, 2; Philadelphia, 1; Cleveland, 1.
Dysentery, bacillary.—Cases New York, 4; Detroit, 2; Charleston, S. C., 1; Nashville, 1; Los Angeles, 4.
Dysentery, unspecified.—Cases: San Antonio, 2; Sacramento, 2.
Rocky Mountain spotted fever.—Cases: Richmond, 1.
Typhus fever.—Cases: Savannah, 1; Tampa, 1; Birmingham, 1; Mobile, 1; New Orleans, 1: Galveston, 1.
Tularemia.—Cases: Billings, 1.

Rates (annual basis) per 100,000 population, by geographic groups, for the 86 cities in the preceding table (estimated population, 1942, 34,567,500)

	Diphtheria case rates	Encephalitis, infectious, case rates	Influenza		Measles case rates	Meningitis, meningococcus, case rates	Pneumonia death rates	Poliomyelitis case rates	Scarlet fever case rates	Smallpox case rates	Typhoid and paratyphoid fever case rates	Whooping cough case rates
			Case rates	Death rates								
New England	5.0	0.0	5.0	2.5	1,219	45.0	117.7	0.0	688	0.0	2.5	113
Middle Atlantic	6.3	0.0	6.3	4.5	905	28.6	65.3	0.4	278	0.0	0.0	22
East North Central	4.7	0 6	4.1	4.7	693	39.8	48.0	0.0	405	0.0	0.6	35
West North Central	7.8	0.0	2.0	3.9	1,920	35.3	96 0	0.0	522	0.0	0.0	31
South Atlantic	10.4	3.5	62.6	8.7	2,050	26.1	71.3	1.7	529	0.0	1.7	97
East South Central	0.0	0.0	23.8	23.8	345	35.7	83.4	0 0	107	0.0	0.0	18
West South Central	12 5	0.0	12.5	6.2	843	31.2	43.7	6.2	44	0.0	9.4	9
Mountain	16 1	0.0	32.2	0.0	1,338	8.1	56.4	0.0	629	0.0	0.0	97
Pacific	22 8	0.0	26.3	8.8	1,055	10.5	40.3	1.8	400	0.0	1.8	33
Total	8.0	0.5	13.2	5.6	1,051	31.0	64.0	0.8	378	0.0	1.1	39

TERRITORIES AND POSSESSIONS

Hawaii Territory

Honolulu—Dengue fever.—For the period March 16–31, 1944, 10 cases of dengue fever were reported in Honolulu, T. H., bringing the total number of cases reported from the beginning of the outbreak to date to 1,456.

Plague (human).—On March 10, 1944, a death from plague occurred in an 8-year old female in Honokaa, Hamakua District, Island of Hawaii, T. H., making a total of 4 deaths reported in this same district for the year to date. Diagnosis has been confirmed.

Plague (rodent).—Rodents proved positive for plague on the dates specified have been reported in Hamakua District, Island of Hawaii, T. H., as follows: Paauhau area—March 14, 1944, 2 mice; March 15, 1 mouse and 1 rat; March 24, 1 mouse; Kapulena area—March 22, 1 rat.

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—Week ended March 25, 1944.—During the week ended March 25, 1944, cases of certain communicable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox		11	42	196	416	84	40	69	165	1,023
Diphtheria	1	8	2	26	3	3	3	4	2	52
Dysentery (bacillary)				3						3
German measles		7		86	54	16	80	11	42	296
Influenza		4			88	2			36	130
Measles	1	119	7	960	576	253	91	195	37	2,239
Meningitis, meningococcus				2	6		5		3	16
Mumps	1	16	54	192	285	94	14	51	38	745
Scarlet fever	2	10	9	57	228	98	29	81	122	636
Tuberculosis (all forms)		1	16	91	58	12		26	76	280
Typhoid and paratyphoid fever				13	1			18		32
Undulant fever				3	1				1	5
Whooping cough		11		21	25	9	1	36	24	127

CUBA

Habana—Communicable diseases—4 weeks ended April 1, 1944.—During the 4 weeks ended April 1, 1944, certain communicable diseases were reported in Habana, Cuba, as follows:

Disease	Cases	Deaths	Disease	Cases	Deaths
Cerebrospinal meningitis	1		Scarlet fever	1	
Diphtheria	22	1	Tuberculosis	15	
Malaria	2	1	Typhoid fever	26	3
Measles	43				

Provinces—Notifiable diseases—4 weeks ended March 25, 1944.—During the 4 weeks ended March 25, 1944, cases of certain notifiable diseases were reported in the Provinces of Cuba as follows:

Disease	Pinar del Rio	Habana [1]	Matanzas	Santa Clara	Camaguey	Oriente	Total
Cancer	1		3	2		10	16
Cerebrospinal meningitis		1					1
Chickenpox		14	1			5	20
Diphtheria		31	3	2		2	38
Hookworm disease		15					15
Leprosy		1					1
Malaria	18	7	16	10		208	259
Measles		64	28				92
Scarlet fever		1					1
Tetanus, infantile						1	1
Tuberculosis	16	23	18	15	4	46	122
Tularemia						1	1
Typhoid fever	9	66	8	24	1	28	136
Yaws						1	1

[1] Includes the city of Habana.

SALVADOR

Vital statistics—Year 1943.—The following table shows the numbers of deaths by cause reported in the Republic of Salvador for the year 1943:

Cause	Deaths	Cause	Deaths
All causes	38,406	Influenza	1,533
Appendicitis	23	Malaria	4,645
Arteriosclerosis	54	Measles	1,712
Avitaminosis	485	Motor car accidents	432
Bronchitis	715	Nephritis	853
Cancer and other malignant tumors	372	Pernicious anemia	205
Cirrhosis of the liver	90	Pneumonia (all forms)	1,901
Congenital debility	742	Rheumatic fever	443
Diabetes	54	Scarlet fever	1
Diarrhea and enteritis (under 2 years of age)	2,993	Senility	506
Diphtheria	39	Suicide	45
Dysentery	509	Syphilis	371
Heart disease	794	Tuberculosis (all forms)	852
Hernia and intestinal obstruction	92	Typhoid and paratyphoid fever	52
Homicide	480	Whooping cough	738
		Ill-defined causes	6,024

NOTE.—Population, 1,880,000.

SWEDEN

Notifiable diseases—January 1944.—During the month of January 1944, cases of certain notifiable diseases were reported in Sweden as follows:

Disease	Cases	Disease	Cases
Cerebrospinal meningitis	10	Poliomyelitis	79
Diphtheria	246	Scarlet fever	2,994
Dysentery	82	Syphilis	89
Gonorrhea	1,667	Typhoid fever	2
Hepatitis, epidemic	727	Undulant fever	8
Paratyphoid fever	11	Weil's disease	2

WORLD DISTRIBUTION OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER

From medical officers of the Public Health Service, American consuls, International Office of Public Health, Pan American Sanitary Bureau, health section of the League of Nations, and other sources. The reports contained in the following tables must not be considered as complete or final as regards either the list of countries included or the figures for the particular countries for which reports are given.

CHOLERA

[C indicates cases]

NOTE.—Since many of the figures in the following tables are from weekly reports, the accumulated totals are for approximate dates.

Place		January-December 1943	January-February 1944	March 1944—week ended— 4	11	18	25
ASIA							
Ceylon	C	50	2				
China: Kwangsi Province	C	[1] 1,100					
India	C	323,270	33,678				
Bombay	C	28					
Calcutta	C	7,007	389	55	94	106	
Chittagong	C	391	60				
Cochin	C	192					
Madras	C	1,219	36				
Negapatam	C	21	15				
Vizagapatam	C	68					
India (French)	C	55					
Chandernagor	C	8					
Karikal	C	30					
Pondichery	C	17					

[1] Cases reported up to Sept. 8, 1943, with a mortality rate of over 25 percent.

PLAGUE

[C indicates cases; D, deaths; P, present]

Place		January-December 1943	January-February 1944	March 1944—week ended—			
				4	11	18	25
AFRICA							
Basutoland	C	[1] 24					
Belgian Congo	C	[2] 51	3				
Plague-infected rats		P					
British East Africa:							
Kenya	C	18	1				
Uganda	C	20		1	1	1	
Egypt	C	163	115				
Port Said	C	10	1				
Suez	C	118	108	1	3	2	3
French West Africa: Dakar	C	32					
Madagascar	C	234					
Morocco (French)	C	299	20				
Rhodesia, northern	C		1				
Senegal	C	251					
Union of South Africa	C	85	20		1		
ASIA							
China: Foochow	C			P			
India	C	10,044	2,836				
Indochina	C	31	10		3		
Palestine	C	13					
EUROPE							
Portugal (Azores)	C	[3] 56					
SOUTH AMERICA							
Ecuador:							
Chimborazo Province	C		1				
Loja Province	C	15					
Peru:							
Ancash Department	C	2					
Ica Department	C	2					
Lambayeque Department	C	2					
Libertad Department	C	26					
Lima Department	C	23					
Lima	C	1					
Plague-infected rats		P					
Piura Department	C	11					
Venezuela: Aragua and Miranda States	C	10					
OCEANIA							
Hawaii Territory:							
Hamakua District	D	7	[4] 3		1		
Plague-infected rats		[5] 93	[5] 22	[6] 5		[6] 4	[7] 2

[1] Includes 12 cases of pneumonic plague in a village south of Mafeteng.
[2] Includes 9 cases of pneumonic plague.
[3] Approximated.
[4] Includes 1 death from pneumonic plague.
[5] Includes 4 plague-infected mice.
[6] Includes 3 plague-infected mice.
[7] Includes 1 plague-infected mouse.

SMALLPOX

[C indicates cases; D, deaths; P, present]

Place		January-December 1943	January-February 1944	March 1944—week ended—			
				4	11	18	25
AFRICA							
Algeria	C	1,741	263				
Angola	C	652					
Basutoland	C	146	10				
Belgian Congo	C	4,643	560	42			
British East Africa:							
Kenya	C	3,439	1,346	164	112	121	91
Mombasa	C	75	56	13			
Tanganyika	C	143	285	26	43	24	
Uganda	C	132	498	69	180	103	
Dahomey	C	156	8				
Egypt	C	4,161	2,031				
French Equatorial Africa	C	173	60				
French Guinea	C	378	134				
French West Africa: Dakar	C	4					
Gambia	C				13		
Gold Coast	C	25	4	1			
Ivory Coast	C	160	196				
Mauritania	C	40					
Morocco (French)	C	1,170	423				
Morocco (Spanish)	C	1					
Mozambique	C	1	1				
Nigeria	C	6,132	678	130	375	187	
Niger Territory	C	308	303				
Rhodesia, northern	C	123					
Senegal	C	111	12				
Sierra Leone	C	3					
Sudan (French)	C	3,795	888				
Tunisia	C	4	5				
Union of South Africa	C	963	16	6	2	1	1
ASIA							
Arabia	C	3	[1] 7				
Ceylon	C	85	6	1			
China: Kunming [2]	C					5	2
India	C	76,531	61,354				
India (French)	C	10					
Indochina	C	5,113	827		93		
Iran	C	631					
Iraq	C	272	75				
Palestine	C	104	4				
Syria and Lebanon	C	1,132	71	32	3		
Trans-Jordan	C	19					
EUROPE							
Belgium	C	1					
France	C	2					
Germany	C	1					
Gibraltar	C	1	P				
Great Britain: London	C				[3] 7	4	
Greece	C	800					
Portugal	C	51	8	1			
Scotland	C	[4] 2					
Spain	C	222	7	9	21		
Switzerland	C	17					
Turkey	C	12,400	1,661				
NORTH AMERICA							
British Honduras	C	1					
Canada	C	6					
Guatemala	C	27					
Honduras	C	2					
Mexico	C	419	665				
SOUTH AMERICA							
Brazil	C	57	2			1	3
British Guiana	C	1					
Colombia	C	391	34	11			
Ecuador	C	25					
Peru	D	12	19				
Lima	C		19				
Venezuela	C	110	18				

[1] Includes 4 imported cases.
[2] Yunnan Fu.
[3] Includes 1 imported case from the Middle East.
[4] Includes 1 case on a vessel from North Africa.

TYPHUS FEVER

[C indicates cases; D, deaths]

Place		January-December 1943	January-February 1944	March 1944—week ended— 4	11	18	25
AFRICA							
Algeria	C	8,321	210				
Basutoland	C	28					
Belgian Congo	C	39	4				
British East Africa:							
Kenya	C	10	3				1
Mombasa	C	1					
Uganda	C	1					
Egypt	C	40,084	3,053				
French Equatorial Africa	C	3					
French Guinea	C	1					
French West Africa: Dakar	C	32	2		1		
Gold Coast	C	9					
Morocco (French)	C	16,191	446				
Morocco (Spanish)	C	401	1	1			
Mozambique	C	1	2				
Nigeria	C	11		1			
Rhodesia, northern	C	14	5		1		
Senegal	C	2					
Sierra Leone	C	3					
Tunisia	C	356	142			[1] 80	
Union of South Africa	C	4,973	2,503	94	110		
ASIA							
Afghanistan	C	520					
Arabia: Western Aden Protectorate	C		15				
China:							
Kunming [2]	C						4
Shanghai	C	12					
India	C	2,113	2	1			
Iran	C	[3] 12,885	[3] 450				
Iraq	C	1,423	9	16	16		
Palestine	C	340	99	21	15		41
Syria and Lebanon	C	95	28	2	1		
Trans-Jordan	C	17	2				
EUROPE							
Bulgaria	C	1,843	293				
France—Seine Department	C	4					
Germany	C	5,058					
Greece	C	99					
Hungary	C	1,012	442	66	75		
Irish Free State	C	20					
Netherlands	C	4	7				
Portugal	C	11					1
Rumania	C	8,441	3,409				[4] 1,649
Slovakia	C	637	152			[5] 44	
Spain	C	640	38	21	3		
Switzerland	C	1					
Turkey	C	4,234	190				
Yugoslavia	C		273				
NORTH AMERICA [6]							
Cuba	C	1					
Guatemala	C	1,334	317				
Jamaica	C	33					
Mexico	C	1,128	432				
Puerto Rico	C	76	11				6
Virgin Islands	C	9	1				
SOUTH AMERICA							
Brazil	C	1					
Chile	C	258	53	2			
Colombia	D	2					
Curacao	C		1				
Ecuador	C	350	53				
Peru	C	17	1				
Venezuela	C	32	7				
OCEANIA							
Australia	C	123	24	2	6	4	4
Hawaii Territory	C	69	16	3	2		1

[1] For the period Mar. 1-20, 1944.
[2] Yunnan Fu.
[3] Approximated on account of overlapping of dates.
[4] For the month of March 1944.
[5] For 3 weeks.
[6] Cases of typhus fever listed in this area are probably of endemic type.

YELLOW FEVER

[C indicates cases; D, deaths]

Place		January-December 1943	January-February 1944	March 1944—week ended—			
				4	11	18	25
AFRICA							
Belgian Congo:							
Babeyru	D		1				
Bondo	D	3					
Costermansville Province	D	1					
Kinzao	D	1					
Leopoldville	C	2					
Stanleyville	D	1					
Yanonge	C	1					
British East Africa: Kenya—Kisumu	C	1					
Dahomey:							
Djougou District	C	[1] 2					
Natitingou	C	[1] 1					
French Guinea:							
Baccoro	C	1					
Dubreka	C	2					
Friguiagbe	C	1					
Matakang Island	D	1					
Gold Coast:							
Asuboi	C	1					
Komenda	C	1					
Takoradi	C	1					
Tamale	C		[1] 1				
Ivory Coast:							
Abidjan	C	3					
Aboisso	C	[1] 1					
Bonoua	C	1					
Soubre	C	1					
Toumodi	D	1					
Portuguese Guinea	C	3					
Senegal:							
Goudiri	D	1					
Kolda	C	1					
Tambacounda	C	2					
Velingara Casamance	C	1					
Sierra Leone: Galinas	C	[1] 1					
EUROPE							
Portugal: Lisbon.[2]							
SOUTH AMERICA							
Brazil:							
Acre Territory	D		1				
Amazonas State	D	1					
Matto Grosso State	D		3				
Para State	D	1					
Colombia:							
Boyaca Department	D	14					
Cundinamarca Department	D	7					
Intendencia of Meta	D	9					
Santander Department	D	1					

[1] Suspected.

[2] According to information dated January 21, 1944, it is reported that a vessel which called at the islands of Sao Tome and Cape Verde arrived at Lisbon, Portugal, with cases of yellow fever on board.

COURT DECISIONS ON PUBLIC HEALTH

City ordinance regulating food carrying vehicles upheld.—(Illinois Supreme Court; *General Baking Co. et al.* v. *City of Belleville*, 51 N.E.2d 546; decided November 19, 1943.) An ordinance of the city of Belleville, Ill., made vehicles carrying and delivering foodstuffs for human consumption in the city subject to daily inspection and required a license fee of $50 a year for each vehicle except those vehicles which were used to deliver foodstuffs from food-dealing establishments in the city, licensed and inspected as such, and which were inspected

under other ordinances. Some baking companies situated in Missouri sought to recover money paid as license fees under the ordinance. The plaintiffs alleged compliance with all of the public health laws of Missouri affecting the manufacture, wrapping, and sealing of all products delivered in Belleville and claimed that the ordinance contravened the commerce, equal protection, and due process clauses of the Federal constitution.

The Supreme Court of Illinois stated that the generally recognized rule was that ordinances to protect public health cannot be said to have so burdened interstate commerce as to render them repugnant to the Federal constitution if the license fees bear a reasonable relation to the cost of enforcement and the terms of the ordinance bear a reasonable relation to the purpose for which passed and are not discriminatory. The fact that the plaintiffs were manufacturers outside of the city, and in no wise subject to other regulations and license fees as were their resident competitors, afforded, according to the court, a reasonable basis for excluding from the general application of the licensing features of the ordinance those who paid license fees under other city ordinances to which the plaintiffs were not subject. It was pointed out that all other provisions of the ordinance attacked were applicable to resident as well as nonresident vendors. The court was of the opinion that there was no unlawful discrimination against plaintiffs and that the requirement that they pay the license fees did not constitute an illegal burden on interstate commerce. The ordinance was not, therefore, open to the constitutional objections urged by the plaintiffs and the lower court's judgment dismissing the complaint was affirmed.

Power of appointment by local board of health in municipality not under commission form of government.—(New Jersey Supreme Court; *Valdes* v. *Baumann*, 34 A.2d 745; decided December 9, 1943.) The relator claimed that he was appointed plumbing inspector of a borough by the mayor and common council. The defendant claimed he held the office by appointment made by the borough board of health. The borough was not governed by the commission government act. By statute the establishment of local boards of health was directed and such boards had the power to appoint officers and agents. The Supreme Court of New Jersey held that the action of the mayor and common council was beyond their power as they could not intrude upon the duties delegated by law to the local board of health in a municipality not governed by the commission government act.

×

FEDERAL SECURITY AGENCY

UNITED STATES PUBLIC HEALTH SERVICE

THOMAS PARRAN, *Surgeon General*

DIVISION OF PUBLIC HEALTH METHODS

G. ST. J. PERROTT, *Chief of Division*

The PUBLIC HEALTH REPORTS, first published in 1878 under authority of an act of Congress of April 29 of that year, is issued weekly by the United States Public Health Service through the Division of Public Health Methods, pursuant to the following authority of law: United States Code, title 42, sections 7, 30, 93; title 44, section 220.

It contains (1) current information regarding the prevalence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

The PUBLIC HEALTH REPORTS is published primarily for distribution, in accordance with the law, to health officers, members of boards or departments of health, and other persons directly or indirectly engaged in public health work. Articles of special interest are issued as reprints or as supplements, in which forms they are made available for more economical and general distribution.

Requests for and communications regarding the PUBLIC HEALTH REPORTS, reprints, or supplements should be addressed to the Surgeon General, United States Public Health Service, Washington, D. C. Subscribers should remit direct to the Superintendent of Documents, Washington 25, D. C.

Librarians and others should preserve their copies for binding, as the Public Health Service is unable to supply the general demand for bound copies. Indexes will be supplied upon request.

UNITED STATES GOVERNMENT PRINTING OFFICE, WASHINGTON : 1944

For sale by the Superintendent of Documents, Washington 25, D. C.

Price 5 cents. Subscription price $2.50 a year

Public Health Reports

VOLUME 59 MAY 5, 1944 NUMBER 18

IN THIS ISSUE

Airplane Dusting for Malaria Mosquito Control

Penicillin in Relapsing Fever Infections

CONTENTS

Public Health Reports

Vol. 59 • MAY 5, 1944 • *No. 18*

AIRPLANE DUSTING WITH PARIS GREEN FOR CONTROL OF *ANOPHELES QUADRIMACULATUS* SAY IN WATER-CHESTNUT COVERED AREAS OF THE POTOMAC RIVER DURING 1943

By WILLIAM C. MURRAY, *Passed Assistant Engineer (R)*, and HERBERT KNUTSON, *Assistant Sanitarian (R), United States Public Health Service* [1]

Water chestnut (*Trapa natans* L.), a fresh-water plant native of Eurasia, was first observed in the Potomac River in 1919. It spread so rapidly that by 1940 it partially or completely covered every bay or cove along the Potomac from Washington, D. C., to Quantico, Va. The characteristic matlike growth of this plant not only greatly hinders navigation but it produces ideal breeding conditions for the principal malaria vector in this region, *Anopheles quadrimaculatus* Say.

In 1940 the United States Engineer Department began cutting the water chestnut, and by the end of 1942 it had been eliminated from many areas in the northern section of the river. This work is part of a long-range program, and complete eradication of the plant cannot be expected for several years.

Because of the proximity of river areas covered by water chestnut to several military establishments (fig. 1), malaria mosquito-control measures were initiated in 1942 by the Office of Malaria Control in War Areas, United States Public Health Service, in cooperation with the health departments of Maryland, Virginia, and the District of Columbia. Airplane-engine-propelled boats, used to apply larvicidal dust to the breeding areas at the start of the 1942 season, proved inadequate because of the extensiveness of the areas and mechanical

[1] Office of Malaria Control in War Areas. The authors desire to acknowledge the advice and assistance given by Senior Entomologist (R) G. H. Bradley and Sanitary Engineer (R) Nelson H. Rector, U. S. Public Health Service, in the planning and prosecution of this work. Further acknowledgment is made of the cooperation given at all times by post commanders and by medical and sanitary officers of the Army, Navy, and U. S. Public Health Service District 2, and health department officials of Maryland, Virginia, and the District of Columbia. Appreciation is expressed to the officials of the Quantico Marine Barracks for use of airport facilities and to the Engineer Board, Fort Belvoir, for the servicing and care of boats. Special mention should be made of the skillful and dependable work of the airplane pilots, Messrs. W. H. Da Camara and N. E. Daughady.

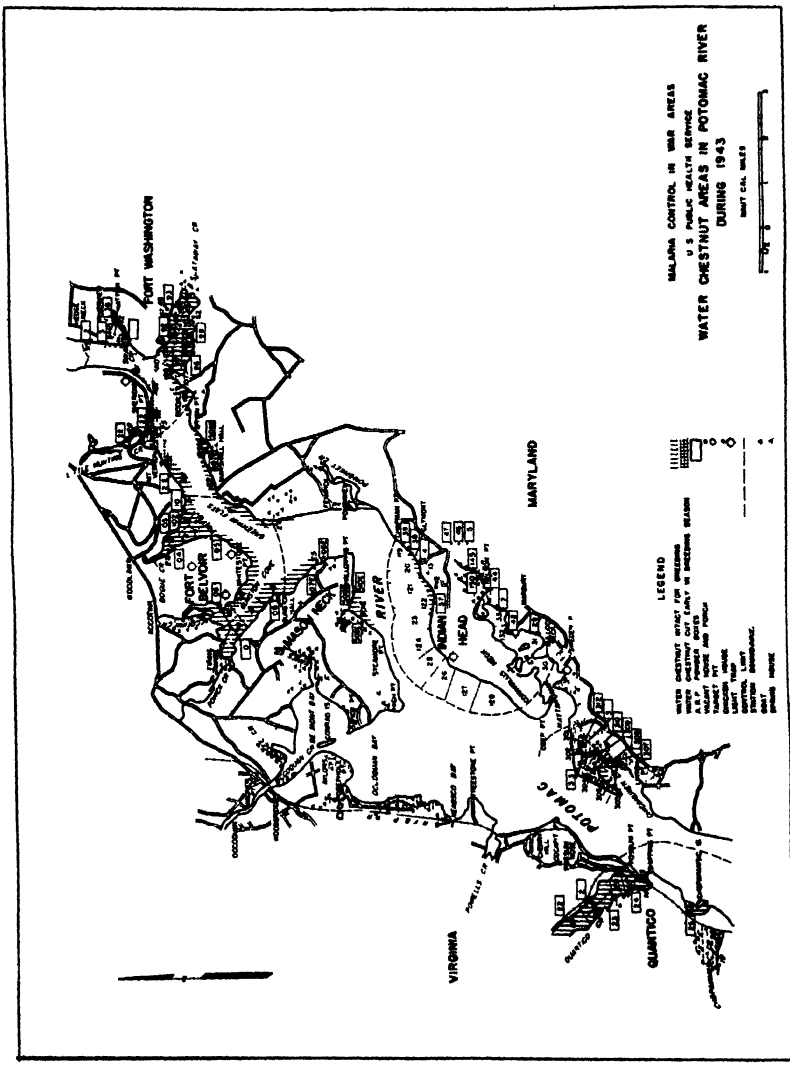

MALARIA CONTROL IN WAR AREAS
U S PUBLIC HEALTH SERVICE
WATER CHESTNUT AREAS IN POTOMAC RIVER
DURING 1943
LEGEND
MARYLAND
VIRGINIA
FORT WASHINGTON
FORT BELVOIR
INDIAN HEAD
QUANTICO
POTOMAC
RIVER

FIGURE 1

difficulties encountered in the operation of the boats. Therefore airplane dusting was resorted to as the most practical method by which control might be attained. The results of airplane dusting during 1942 were such as to recommend its continued use during 1943.

During 1943 water chestnut was first noted about May 17 and reached maximum growth during early July. Anopheline breeding was general over all the water-chestnut areas but was most prevalent where medium-sized plants predominated. In a few areas duckweed (*Lemna* sp.) invaded the water chestnut late in the season and was noted to decrease breeding. By early August the water chestnut had started to decrease, and it had nearly disappeared by mid-September.

OPERATIONS

The engineering and operational phases of the airplane-dusting program for 1943 were under the direction of the senior author. Actual dusting operations were performed by a commercial dusting company on an hourly basis. Turner Field, a United States Marine Corps flying field at Quantico, Va., was used as the base of operations.

Two Stearman biplanes, each equipped with a hopper having a capacity of 600 pounds of insecticide mixture, were used for the work. The quantity of larvicide released was regulated by a lever located in the cockpit which controlled the size of the opening in the bottom of the hopper. When wide open, approximately 4½ pounds of mixture (1 pound of paris green) was released per acre with a plane speed of 70 miles per hour. Uniform feeding of the larvicide through the opening was obtained by the action of an agitator which consisted of a rotating wire located in the lower half of the hopper and operated by a wind-propelled fan fitted to a reduction gear. The action of the agitator also prevented any caking of the larvicide.

The planes dusted at an approximate elevation of 15 feet and at a speed of 70 miles per hour (fig. 2). No dusting operations were undertaken when the wind velocity exceeded 6 miles per hour, since higher wind velocities caused too much drift, particularly in open areas. Heavy, overcast weather, with accompanying low wind velocities, proved the best for dusting, under which conditions a clearly defined swath of approximately 40 feet, with very little drift, was obtained. On clear days several hours in midday were accompanied by wind velocities too high for dusting. All dusting was done after the disappearance of early morning dew except in those instances where vegetation protruded only a fraction of an inch above the water level. In these latter cases, the presence of dew did not decrease the effectiveness of the larvicide. In cases where the vegetation extended several inches above the water, the plane flew at very low altitudes, from 8 to 10 feet, and literally blew the dust under the vegetation. This

proved very effective in Piscataway Creek, where plant growth was most luxuriant.

The insecticidal dust used was paris green mixed with soapstone as a diluent in a 1:4 ratio by volume. The ingredients were mixed in a hand-operated cylindrical mixer, placed in bags of 75-pound capacity, and stored in a dry warehouse adjacent to the flying field.

The maximum acreage of water chestnut in the areas under control adjacent to the six military establishments was as follows:

	Acres
Fort Belvoir:	
Dogue Creek	620
Gunston Cove (including Pohick Creek and Accotink Creek)	810
Potomac River (Maryland side)	54
Total	1,484
Fort Washington:	
Potomac River (Fort Washington-Mockley Point)	142
Piscataway Creek	590
Swan Creek and adjacent Potomac River	70
Total	802
Fort Hunt:	
Little Hunting Creek and adjacent Potomac River	240
Quantico Marine Barracks:	
Quantico Creek and adjacent Potomac River	515
Stump Neck—Naval Proving Grounds:	
Chicamuxen Creek	123
Indian Head—Naval Powder Factory:	
Mattawoman Creek and Potomac River	30

In addition to the above water-chestnut acreages, 570 acres of inland swamp were regularly dusted during the season.

The total area dusted varied from a maximum of 3,764 acres during the week of July 4 to a minimum of 1,140 acres during the week of September 19. The average application per acre for each treatment for the season was 5.40 pounds of insecticide mixture containing 1.24 pounds of paris green. At the beginning of the season (week of July 4) a minimum of 1.01 pounds of paris green per acre was applied, while a maximum of 1.52 pounds per acre was applied during the height of the breeding season (week of August 29). A total of 32,536 acres was dusted during the entire season, using 40,277 pounds of paris green and requiring 243 hours and 47 minutes of dusting time. Dusting was done at 7-day intervals over a period of 12 weeks, extending from the week of July 4 to the week of September 19.

Good dust coverage of the breeding acres was indicated by routine observations of operations and by the finding of low *Anopheles* larval densities within the control limits as compared to those beyond such limits. The entire project, including all expenditures for supervision, labor, and materials, was accomplished at an average cost of $1.20 per acre per application.

FIGURE 2 —Dusting operations on Potomac River with Stearman biplane

FIGURE 3 —Airplane-engine-propelled boat equipped with power duster.

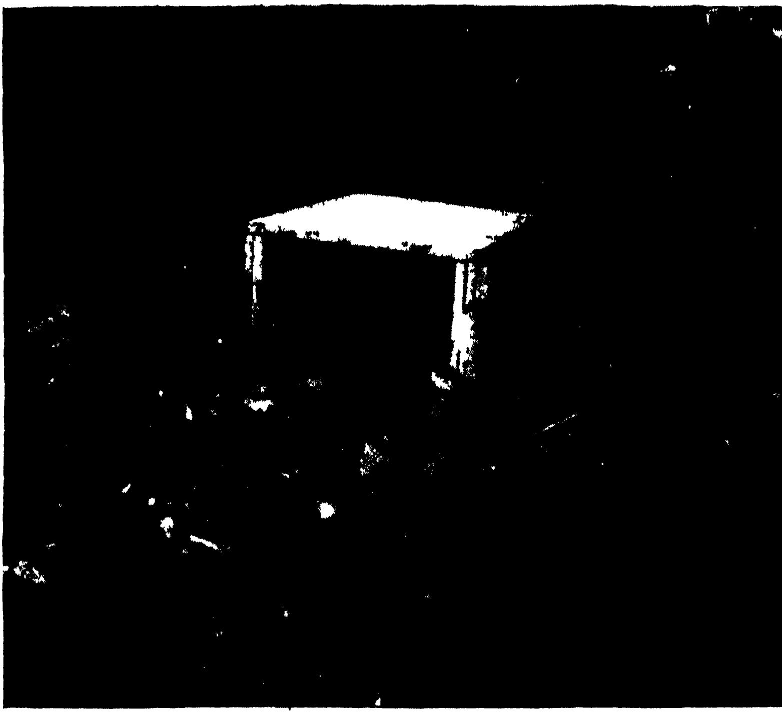


FIGURE 4 —Upper—Powder box used as adult resting place Lower— Target pit used as adult resting place

A summary for the season's operations, showing the total acreage dusted, amounts of dust applied, dusting time, and rates of application is given in table 1.

TABLE 1.—*Summary of dusting operations of water-chestnut areas, Potomac River, 1943*

Areas	Acreage	Paris green (pounds)	Pounds paris green per acre	Diluent soapstone (pounds)	Dusting time	
					Hrs.	*Min.*
Fort Belvoir	13,429	17,858	1.34	59,949	114	02
Fort Hunt	940	1,468	1.56	4,913	11	22
Fort Washington	5,236	6,937	1.32	23,182	52	46
Indian Head	3,665	3,781	1.03	12,666	19	55
Stump Neck	1,086	1,580	1.46	5,304	7	28
Quantico	7,680	8,105	1.06	27,144	35	10
Areas outside control zone	500	548	1.09	1,837	3	06
	32,536	40,277	1.24	134,995	243	47

ENTOMOLOGICAL SERVICES

The entomological services on the program were under the direction of the junior author. These consisted primarily of coordinating the inspection work of the States concerned, by which effectiveness of the dusting was determined. Based upon the data obtained, recommendations were made to the operations officer, to guide him in regulating the frequency, rate, and extent of dust applications.

In order to determine the efficiency of the larvicide work and its effect in controlling *A. quadrimaculatus*, 55 larval and 53 adult index stations were established, at which inspections were made at least once each week. The majority of these stations were located within the dusted area (within "control limits"), which included the area within approximately 1 mile of each respective military establishment. Other adult and larval stations were established outside the dusted area (outside "control limits") to serve as a check on dusting effectiveness. Larval samplings, made with a pint dipper, totaled 110,000 for the season. *A. quadrimaculatus* made up 12 percent of the mosquito population. Of the remainder, *Uranotaenia sapphirina* (O. S.) made up 49 percent and *Culex* spp. 39 percent. The *Culex* species ranked as follows in order of abundance: *salinarius* Coq., *erraticus* D. & K., *restuans* Theob., *apicalis* Adams, and *pipiens* L. Airplane-engine-propelled boats (fig. 3) were used chiefly in making these larval inspections. Several types of natural resting places, as well as suitably placed powder boxes (fig. 4) measuring 12 by 16 by 29 inches were used as adult index stations.

Reduction of potential malaria hazard.—Although immediate needs for dust applications are determined by the number of small and large larvae and pupae found weekly in the water samplings, the effectiveness of a control program in reducing the potential malaria hazard is

best measured by the number of females present in the area, since the adult female alone transmits the disease. An index to the abundance of adult females is obtained by the numbers occurring in natural resting places. The highest female count during any one series of resting-place examinations inside the control limits as compared to those outside has been used to determine results (fig. 5). In the charts presented herein the curves representing collections outside control limits have been smoothed by application of the formula $\frac{a+2b+c}{4}$, when b is the count being smoothed and a and c the counts immediately preceding and succeeding, respectively.

Anopheles breeding conditions in controlled areas.—At Fort Belvoir, the first anopheline larvae were taken on July 13. Collections were very low or negative throughout the season but reached a small peak during early September, when small larvae appeared in relatively large numbers. During the season only three large larvae, and no pupae, were taken in more than 16,000 dips. Adult collections also remained low (fig. 5). The highest collection from any one resting place adjacent to the Fort was 1 male and 3 females, and the highest within the control limits was 12 males and 4 females. Both of these collections occurred on August 17. Further evidence of scarcity of *A. quadrimaculatus* in this control area is given by a comparison of 1942 and 1943 light-trap catches. During August of 1942 a maximum of 474 females was taken in one single collection, with a mean for the month of 69.4 per night per trap; the maximum for August 1943 was 3 females, with a mean of 0.31 per night per trap.

At Fort Hunt, cutting of the water chestnut by the United States Engineers early in the season greatly reduced the breeding possibilities. Collections in the river totaled only three larvae, and only six adults were taken from resting places during the season (fig. 5).

At Quantico, larval collections were consistently low, with the exception of one series of collections during the last half of August, when 42 small and 9 large larvae were found. Weekly dusting operations apparently were successful in preventing any considerable emergence in this instance, as only 3 adults were taken subsequent to this high larval collection. During the early season, adult station collections also remained low (fig. 5). The maximum adult density for the entire season was reached on August 18, when an average of 6.5 males and 5.7 females per resting place occurred. The highest individual resting-place count adjacent to the Quantico base also occurred on this date, when 7 males and 6 females were taken.

At Fort Washington, the only major problem was encountered, and this was limited to the early portion of the season. Breeding began on July 1, when 6 larvae were taken in 3,420 dips. This

was 13 days in advance of the finding of larvae in any other control area. Dusting operations began on July 8, and on July 10 no larvae or pupae could be found in inspections which involved the taking of 4,560 dips. Larval counts continued low until August 4, when 80 large larvae were found in 890 dips. On this occasion dusting planes were immediately dispatched to the breeding area for supplementary work. On the following day only 2 large and 2 small larvae

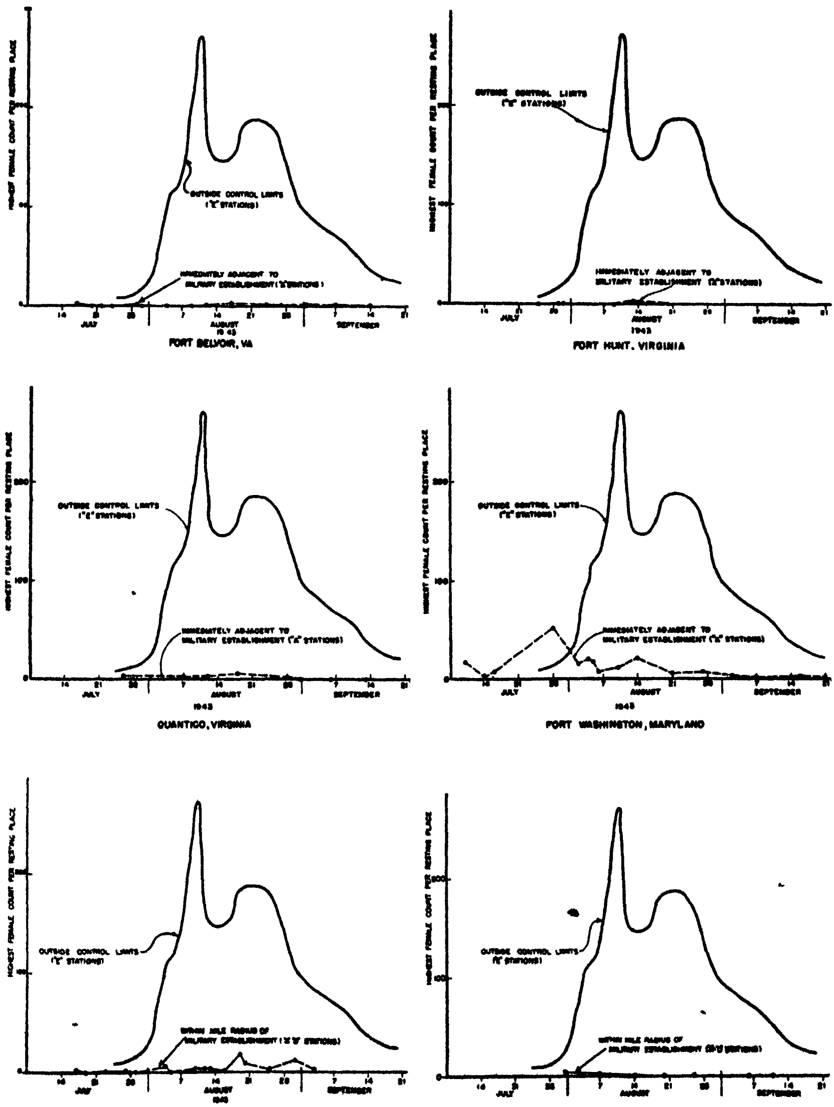


FIGURE 5.—Results of *Anopheles quadrimaculatus* control work on the Potomac River. (Outside adult densities compared with those inside.)

581704—44——2

could be found in 560 dips. The finding of adults and larvae in this control area 2 weeks in advance of the other water-chestnut areas gives a likely explanation for the fact that populations here exceeded those outside the control area from the beginning of the season (July 8) until the end of July (fig. 5). The highest resting-place count of the season adjacent to the fort was made on July 28, when 46 males and 54 females were taken in a target pit (fig. 4), a large ideal shelter. After the first week in August, mosquito counts adjacent to the fort remained relatively low.

Although breeding of *A. quadrimaculatus* during 1943 was greater at Fort Washington than at any other of the war areas along the river, it was considerably lower than during 1942. In August of that year, before plane dusting was initiated, individual counts of adults in shelters reached a maximum of 1,200 specimens, this collection being made in the above-mentioned target pit. The mean number of larvae taken per dip for that month was 0.33. Corresponding records for 1943 showed a maximum count of only 55 males and 15 females, which also occurred in the target pit, and only 0.0117 larvae per dip.

A plausible explanation for the early and intensive infestation at Fort Washington is that large numbers of *A. quadrimaculatus*, which were found overwintering in cement blockhouses on the reservation, dispersed early and oviposited in the water chestnut at first opportunity. It seems likely that the early season infestation of the water chestnut in this area might be materially reduced by killing the females in the cement houses before they emerge from hibernation in the spring. Although larval density was very low at the beginning of the season, it was scattered over a large breeding area of 590 acres. This early breeding resulted in the production of a considerable number of adults before dusting operations began, and high resting-station counts resulted from these adults concentrating in the few good natural resting places.

At Stump Neck, collections of both adults and larvae of *A. quadrimaculatus* were very low throughout the season (fig. 5). A total of only 16 small and 3 large larvae, and 3 male and 6 female adults, were found. No adults were taken immediately adjacent to the establishment, and the highest individual collection was 1 male and 3 females at a resting place nearly 1 mile away.

At Indian Head, the water chestnut was confined to a narrow strip along the river channel. In this strip only 5 large larvae were taken, and it is believed that some of these floated in from uncontrolled areas upstream. Resting-place counts were also very low throughout the season at all index stations, with one exception, a springhouse. In this station adults were constantly found, with numbers reaching a peak of 19 males and 19 females on August 19 (fig. 5). Numerous

potential upland breeding places occur in this vicinity, and it appeared that these places were the principal breeding areas, since adults continued to be present in numbers several weeks after the disappearance of the water chestnut in the river.

Anopheles breeding conditions in uncontrolled areas.—In the water-chestnut areas outside control limits, *quadrimaculatus* breeding began about July 13, but high populations were not encountered until the first week in August. Thereafter the larval densities in these areas greatly exceeded those within the control limits. Maximum densities were reached on September 1, when 650 larvae were taken in 70 dips; following this a rapid decrease in numbers occurred. By mid-September only small patches of the water chestnut remained, but in these there was heavy breeding. Because of this condition, and in an effort to decrease the numbers of adults entering hibernation, all remaining water-chestnut areas were dusted on September 15 and 23. The occurrence of adults in resting places in these uncontrolled areas (fig. 5) likewise greatly exceeded those within the control limits. Adult densities began to rise abruptly in early August, peaks being reached on the 11th and 25th. On the former date a total of 900 males and 800 females were taken in two powder boxes, and on the latter date 524 males and 566 females were taken from these same places. Thereafter the numbers gradually decreased, and none was found in late September.

Reduction of general anopheline populations.—As has been stated, the size of the adult female *quadrimaculatus* population in an area determines the potential malaria hazard as far as the vector is concerned. The general effect of control measures in reducing anopheline populations, in this case the application of paris green as a larvicide, can only be measured by considering the ratio of collections of larvae and of adults inside with those in similar areas outside the control limits. This comparison is given in figure 6 and table 2.

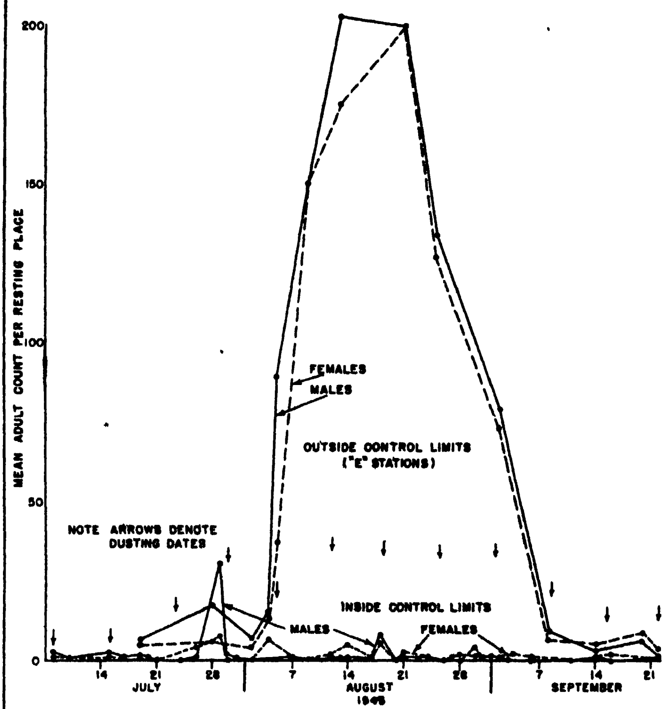
TABLE 2.—*Control of* A. quadrimaculatus *at six military establishments on the Potomac River*

[Densities of larvae and adults outside control areas compared to those inside]

Location	Number of larvae per 100 dips for season		Indicated control based on large larvae[1] (percent)	Number of adults per resting place for season		Indicated control based on adult females (percent)
	Small	Large[1]		Males	Females	
Uncontrolled areas	44.60	40.53		73.1	63.9	
Controlled areas:						
Fort Washington	.47	.54	98.67	14.0	6.5	89.83
Indian Head	.14	.01	99.98	1.6	2.2	96.58
Quantico	.50	.16	99.61	1.6	1.6	97.50
Fort Belvoir	.60	.02	99.96	.7	.9	98.59
Fort Hunt	.08	.04	99.91	.4	.4	99.38
Stump Neck	.44	.09	99.78	.1	.2	99.69
Mean (controlled areas)	.37	.14	99.65	3.0	2.0	96.93

[1] Includes pupae.

The table shows the densities of larvae and adults inside and outside control areas, as indicated by index-station collections, and the approximate percentage of general control based on comparable adult female collections. It is believed that the inside and outside indexes are quite comparable because of the uniform breeding habitat furnished by the water chestnut. As shown by the figures presented, the control varied from a minimum of 89.83 percent at Fort Washington to a maximum of 99.69 percent at Stump Neck, with a mean of 96.93 percent control for all six military establishments.



COMBINED SUMMARY OF THE SIX MILITARY ESTABLISHMENTS
RESULTS OF *Anopheles quadrimaculatus* CONTROL WORK ON THE POTOMAC RIVER
(OUTSIDE ADULT DENSITIES COMPARED TO THOSE INSIDE, BASED ON MEAN COUNT)

FIGURE 6.

SUMMARY AND CONCLUSIONS

Water-chestnut-covered areas in the Potomac River afford prolific breeding grounds for *A. quadrimaculatus*, the principal malaria vector in eastern United States. Because of the close proximity of six military establishments to these areas, control measures against this mosquito were carried on in 1942 and 1943 by the Office of Malaria

Control in War Areas of the United States Public Health Service. This paper deals with the more comprehensive control program of the latter year.

Weekly dustings with paris green applied by airplane were made throughout the *quadrimaculatus* breeding season. A total of 32,536 acres was dusted, and 40,277 pounds of paris green were applied.

The average cost of the work was $1.20 per acre per application. This includes all expenditures for supervision, labor, and materials.

An indicated over-all control of 96.93 percent of *A. quadrimaculatus* mosquitoes in the protected areas was shown by weekly inspections carried out at more than 100 larval and adult index stations. These stations were located both inside and outside of the control zones, and the degree of control was determined by comparing the numbers of mosquitoes inside to those outside.

The most important factors in the successful prosecution of this work were:

(1) Complete organization in advance of inauguration of control operations.
(2) Coordination between, and full utilization of, engineering and entomological services.
(3) Regulation of frequency, rate, and extent of dust application through careful consideration of entomological findings.
(4) Skillful work of the airplane pilots in applying the larvicide.
(5) Detailed and close supervision of operations and inspections.

THE THERAPEUTIC EFFICACY OF PENICILLIN IN RELAPSING FEVER INFECTIONS IN MICE AND RATS [1]

By HARRY EAGLE, *Surgeon*, and HAROLD J. MAGNUSON, *Assistant Surgeon United States Public Health Service*, with the technical assistance of ARLYNE D. MUSSELMAN

The demonstrated effectiveness of penicillin in the treatment of, many bacterial diseases has prompted search for other infections in which this antibiotic might prove useful. The recent finding by Mahoney, Arnold, and Harris (*1*) that penicillin was of value in the treatment of syphilis suggested that penicillin might also be effective against the spirochetes of relapsing fever, this despite fundamental differences in the metabolism of the two organisms. The present report deals with the efficacy of penicillin in the treatment of white rats and mice experimentally infected with *Borrelia novyi*.

METHODS AND MATERIALS

Throughout the course of the experiment, the strain of *B. novyi* [2] was maintained by passage in rats at 3-day intervals, 0.1 cc. of infected

[1] From the Venereal Disease Research and Postgraduate Training Center, U. S. Public Health Service, Johns Hopkins Hospital, Baltimore, Md.
[2] Kindly supplied by Dr. Martin Frobisher and Dr. Ts'un T'ung of the Johns Hopkins School of Hygiene.

blood injected intraperitoneally regularly producing a massive blood infection within 24 to 48 hours.

Preliminary experiments soon indicated that while penicillin was effective against *B. novyi* infections in both rats and mice, in determining the minimum curative dose rigorous controls would have to be maintained because of the irregular and relapsing course of the disease in these animals. With a small inoculum (10^5 organisms into a white mouse), organisms disappeared from the blood within 72 to 96 hours and could thereafter be demonstrated in only a small proportion of the animals. Even the inoculation of 10^7 and 5×10^7 organisms into rats and mice, respectively, failed to produce a uniformly fatal infection. Here also the well-known tendency of the organisms to disappear spontaneously from the blood stream made the direct examination of the blood an inadequate criterion of cure. Accordingly, rats and mice which had been apparently "cured" by penicillin, in that the blood was persistently dark-field negative, were further tested 5 to 15 days after the completion of treatment by injecting their citrated blood, obtained by cardiac puncture, into a normal animal (0.4 to 0.5 cc. for rats and 0.1 to 0.2 cc. for mice). The blood of the transfer animal was examined at intervals over the following 2 weeks. Even this was not a rigid criterion of cure, since only 6 of 10 untreated rats proved infectious when their blood was transferred during a dark-field negative phase. It is therefore probable that some animals adjudged "cured" may nevertheless have harbored residual organisms. This would be particularly true at dosages which "cured" only a portion of the animals.

RESULTS IN WHITE RATS

Young white rats weighing between 45 and 80 gm.[3] were inoculated intraperitoneally with 0.5 cc. of infected blood diluted with normal rat serum or plasma so as to contain 2×10^7 organisms per cubic centimeter. The inoculum thus consisted of 1×10^7 organisms. Treatment was begun 24 hours later, when large numbers of spirochetes could always be found by dark-field examination of the peripheral blood. The calculated dose of the sodium salt of penicillin in 0.1 to 1.0 cc. of 0.85 percent NaCl was given intraperitoneally five times daily at 4-hour intervals (8 a. m., 12 n., 4 p. m., 8 p. m., and 12 m.) for each of 2 successive days. In four separate experiments a total of 71 rats was treated at various dosage levels and 20 rats were used as untreated controls (table 1).

Twelve hours after the completion of treatment, blood from the control animals contained enormous numbers of spirochetes. Most rats which had received a total of only 5,000 or 10,000 units of peni-

[3] Within an individual experiment, weights differed by a maximum of 20 gm. Each rat was treated on a per kilogram basis.

cillin were also dark-field positive, but with relatively few organisms; animals treated with larger doses were regularly dark-field negative. However, beginning 36 hours after the completion of treatment, a considerable number of the treated and apparently "cured" animals began to relapse. These were considered treatment failures. Additional failures were found by injecting the blood of rats which failed to relapse into normal rats as described above.

Table 1 is a summary of four individual experiments, each with a different commercial brand of penicillin, and all with quantitatively similar results. As is there shown, the dose which cured 50 percent of the animals was approximately 130,000 units per kilogram of body weight, and the dose necessary to cure 95 percent of the animals was approximately 400,000 units per kilogram. The latter curative dose approached the toxic level of the particular lot of commercial penicillin used in that experiment.[4]

TABLE 1.—*The efficacy of penicillin in the treatment of relapsing fever* (Borrelia novyi) *in white rats*

[Animals were inoculated intraperitoneally with 10^7 organisms. Treatment with penicillin (intraperitoneal) was begun 24 hours later, repeated five times daily at 4-hour intervals for 2 days. Dosages are expressed in Oxford units]

Penicillin dosage		Number of rats treated [1]	Treatment failures			Total failures	"Cures"	Results recalculated by method of Reed and Muench (6)			Curative dose	
Units/kg. per injection	Units/kg. total		Deaths [2]	Spirochetes reappearing in blood more than 36 hours after completion of treatment	Blood infectious despite persistent absence of visible spirochetes			Failures	"Cures"	Percent "cured"	CD_{50} [3]	MCD [3]
1,000	10,000	4	...	4	0	4	0	28	0	0	130,000 units per kg.	400,000 units per kg.
2,000	20,000	6	...	3	2	5	1	24	1	4		
4,000	40,000	10	1	4	3	7	2	19	3	14		
8,000	80,000	10	1	1	3	4	4	12	7	34		
16,000	160,000	11	1	5	1	6	4	8	11	58		
32,000	320,000	11	....	1	1	2	8	2	19	90		
64,000	640,000	[4]14	[4]2	0	0	0	12	0	31	100		
Controls	0	20	9	11	Of 10 rats tested during dark-field-negative phase, the blood of 6 proved infectious for normal rats.	---	----	----	----	----		

[1] Five deaths occurring before completion of treatment not included in following columns.
[2] Because of possibility that these may have been adventitious deaths, they are not included in the column "total failures."
[3] CD_{50}=dose which cured 50 percent of animals. MCD=minimal curative dose (>95 percent cured).
[4] Three rats died within 12 hours after completion of treatment, and two additional animals died in the following 4 days, perhaps due to the toxicity of the drug.

[4] Five of 14 rats receiving total dosages of 640,000 units penicillin per kilogram (individual injections of 64,000 units per kilogram) died during treatment, or soon after, apparently because of the primary toxicity of the particular preparation used. This is to be compared with the results reported by Hamre, Rake, McKee, and MacPhillamey (5) who found that a single injection of 100,000 units penicillin (1 gm. of the crude preparation) per kilogram produced severe reactions or death in mice, guinea pigs, and rabbits. Whether these deaths observed in rats were due to penicillin itself, or to associated impurities, will be resolved as purer preparations become available.

RESULTS IN MICE

A single experiment was carried out with male white mice weighing 16 to 20 gm. This was similar to the rat experiment, save that the mice were inoculated with five times as many organisms (5×10^7), and the volume of each treatment varied between 0.14 and 0.57 cc. It is of interest to note that the occasional toxic deaths observed in rats at the highest dosage of penicillin (64,000 units per kilogram, repeated every 4 hours) were not observed in mice simultaneously treated at the same dosage with the same lot of penicillin.

TABLE 2.—*The efficacy of penicillin in the treatment of relapsing fever* (Borrelia novyi) *in white mice*

[Animals were inoculated intraperitoneally with 5×10^7 organisms. Treatment with penicillin (intraperitoneal) was begun 24 hours later, repeated five times daily at 4-hour intervals for 2 days. Dosages are expressed in Oxford units]

Penicillin dosage			Treatment failures					Results recalculated by method of Reed and Muench (6)			Curative dose	
Units/kg. per injection	Units/kg. total	Number of mice treated [1]	Deaths	Spirochetes reappearing in blood more than 36 hours after completion of treatment	Blood infectious for normal mice 10 days after treatment, despite persistent absence of visible spirochetes	Total failures	"Cures"	Failures	"Cures"	Percent "cured"	CD_{50} [2]	MCD [2]
2,000	20,000	5	2	1	1	4	1	15	1	6	100,000 units per kg.	400,000 units per kg.
4,000	40,000	6	4	1	0	5	1	11	2	15		
8,000	80,000	5	3	0	0	3	2	6	4	40		
16,000	160,000	5	1	0	0	1	4	3	8	73		
32,000	320,000	6	1	1	0	2	4	2	12	86		
64,000	640,000	5	0	0	0	0	5	0	17	100		
Controls	0	8	4	3	0	7	1 transfer also negative	-----	-----	-----		

[1] Five mice which died before treatment was completed are not included in the following columns.
[2] CD_{50}=dose which cured 50 percent of animals. MCD=minimal curative dose (> 95 percent cured).

Because of the larger inoculum, a considerable proportion of the control untreated mice, and of those receiving relatively small doses of penicillin, died within a few days after inoculation. As with the rats, some of the mice relapsed. The dose which cured 50 percent of the mice was approximately 100,000 units per kilogram, and the dose which cured 95 percent was approximately 400,000 units per kilogram. Both values are reasonably close to the corresponding values in white rats.

DISCUSSION

As this work was being completed,[5] reports appeared from twe different laboratories indicating penicillin to be effective in tho

[5] A preliminary report on the efficacy of penicillin in the treatment of experimental relapsing fever was submitted to the Committee on Medical Research on November 1, 1943.

treatment of *B. novyi* infections in mice. Large doses were used in both instances, and no attempt was made to determine the minimum curative dose. In the experiments reported by Heilman and Herrell (*2*), 26 mice were treated with a total of 4,000 units of penicillin, or approximately 200,000 units per kilogram, distributed in five injections daily over a 4-day period. Only 1 of the treated mice died, while 21 of 28 untreated control mice died. No transfers were made to normal mice as a criterion of actual cure.

In the experiments reported by Augustine, Weinman, and McAllister (*3*), 6 mice were treated with a total of 9,000 units, or approximately 450,000 units per kilogram, administered in divided doses every 3 hours over a 48-hour period, with 5 mice as untreated controls. No spirochetes were seen in the blood of treated mice 27 hours after treatment, and the blood of two mice failed to infect normal mice 60 hours after treatment. The blood of a single mouse which had received a total of 4,000 units in 19 hours, or approximately 200,000 units per kilogram, was found to be infectious for a normal mouse, although no spirochetes could be seen in the original blood specimen.

In our own experiments, the CD_{50} in both rats and mice has been found to be on the order of 100,000 to 130,000 units per kilogram, and the regularly curative dose on the order of 400,000 units per kilogram. If those results are applicable to man, the curative dose in a man weighing 60 kg. would be approximately 25,000,000 units. At least until penicillin is available in larger amounts, its routine use in such large doses would not appear warranted for an infection which usually responds promptly to arsenical therapy, and particularly in view of the possible toxicity at those high dosages of the relatively crude penicillin preparations presently available.

It is possible, if unlikely, that other strains of this organism may be considerably more susceptible to penicillin than the novyi strain hitherto used. It is further possible that the disease is more amenable to treatment in man than it is in rats or mice. For the present, however, or until these possibilities have been explored, the only practical application of penicillin in the treatment of relapsing fever would appear to be those cases which, like the three reported by Francis (*4*), fail to respond to arsenical therapy.

SUMMARY

The total dosages of penicillin which "cured" 50 percent of white rats and mice infected with *Borrelia novyi* were 130,000 units and 100,000 units per kilogram, respectively. Approximately 400,000 units per kilogram were necessary to cure more than 95 percent of the

animals. This was half the dose which killed a significant proportion of the rats.

If these results can be translated to man, they imply that the curative dose of penicillin in man would be on the order of 25,000,000 units. Unless relapsing fever is more amenable to treatment in man than it is in these experimental animals, or unless other strains of the organism prove more susceptible to penicillin, the therapeutic use of the drug would not appear warranted except in arsenic-resistant cases, at least until such time as it is available in larger quantities.

REFERENCES

(*1*) Mahoney, J. F., Arnold, R. C., and Harris, A: Penicillin treatment of early syphilis. Ven Dis. Inf., **24**: 355 (1943).

(*2*) Heilman, F. R., and Herrell, W. E.: Penicillin in the treatment of experimental relapsing fever. Proc. Staff Meetings Mayo Clinic, **18**: 457 (1943).

(*3*) Augustine, D. L., Weinman, D., and McAllister, J.: Rapid and sterilizing effect of penicillin sodium in experimental relapsing fever infections and its ineffectiveness in the treatment of trypanosomiasis and toxoplasmosis. Science, **99**: 19 (1944).

(*4*) Francis, E.: Longevity of tick *Ornithodoros turicata* and of *Spirocheata recurrentis* within this tick. Pub. Health Rep., **53**: 2220 (1938).

(*5*) Hamre, D. M., Rake, G., McKee, C. M, and MacPhillamey, H. B.: The toxicity of penicillin as prepared for clinical use. Am. J. Med. Sci., **206**: 642 (1943).

(*6*) Reed, L. J., and Muench, H.: A simple method of estimating 50 percent end-points. Am. J. Hyg., **27**: 493 (1938).

DEATHS DURING WEEK ENDED APRIL 22, 1944

[From the Weekly Mortality Index, issued by the Bureau of the Census, Department of Commerce]

	Week ended Apr. 22, 1944	Corresponding week, 1943
Data for 93 large cities of the United States		
Total deaths	9,288	9,417
Average for 3 prior years	8,755	
Total deaths, first 16 weeks of year	160,440	161,465
Deaths under 1 year of age	608	640
Average for 3 prior years	590	
Deaths under 1 year of age, first 16 weeks of year	10,130	11,271
Data from industrial insurance companies		
Policies in force	66,380,649	65,493,588
Number of death claims	13,160	12,121
Death claims per 1,000 policies in force, annual rate	10.4	9.7
Death claims per 1,000 policies, first 16 weeks of year, annual rate	11.2	10.6

PROVISIONAL MORTALITY FOR THE FIRST 9 MONTHS OF 1943

The mortality rates in this report are based upon preliminary data from 39 States, the District of Columbia, Alaska, Hawaii, and the Canal Zone. Comparative data for the first 9 months of 1942 and 1941 are presented also for 37 States and the District of Columbia.

This report is made possible through a cooperative arrangement with the respective States, which furnish provisional quarterly tabulations of current births and deaths to the United States Public Health Service. Because of some lack of uniformity in the method of classifying deaths according to cause, as well as some delay in filing certificates, these data are preliminary and some deviation from the final figures may be expected, especially for specific causes of death for individual States. However, in the past these preliminary reports have reflected with considerable accuracy the trend in mortality for the country as a whole, and it is believed that the trend in each State is reasonably accurate even though the comparison of the causes of death for different States is subject to the errors mentioned above.

Population estimates for the different States used in computing rates were as follows 1943—official United States Census Bureau estimates of the total population in each State as of March 1, 1943, based on registration for War Ration Book Two and corrected for soldiers and sailors stationed within the States; 1942—United States Census Bureau estimates of the total population as of July 1, 1942, based on registration for War Ration Book One with the same corrections noted above; 1941—average of the total enumerated population according to the Federal census of April 1, 1940, and the estimated total population as of July 1, 1942.

The mortality rate from all causes for the first 9 months of 1943 was about 4 percent higher than that for the first 9 months of 1942, but it was the same as the rate for the corresponding period in 1941. The increase in the death rate from all causes has been widespread; 27 of the 38 States for which data are available reported a higher rate in 1943 than in 1942, 10 reported a decrease in the rate, and in 1 State the rate was the same. During each of the 3 quarters of the year the rate exceeded that for the corresponding quarter in 1942. The death rate from all causes among persons insured in the industrial department of the Metropolitan Life Insurance Co. for the first 9 months of the year was almost 8 percent above the rate for the first 9 months of 1942, and about 4 percent above the rate for the same period in 1941. Preliminary figures for 42 States and the District of Columbia, based on data received from the Bureau of the Census, show a death rate from all causes of 10.9 for the first 9 months in 1943, as compared with 10.2 for the first 9 months in 1942.

The birth rate for the first 9 months of 1943 was 21.2 per 1,000 population, an increase of almost 8 percent over the corresponding period in 1942, and more than 15 percent over 1941. Thirty-five of the 36 States for which information is available reported an increase in the birth rate over the first 9 months in 1942, and in 1 state the rate was the same. The rate increased in each of the 3 quarters of 1943 over the corresponding quarter in each of the 2 preceding years.

Infant and maternal mortality continued to decrease. Infant mortality in the first 9 months of 1943 was 40 per 1,000 live births, as compared with 41 and 46 for the corresponding period in 1942 and 1941, respectively. During the first and second quarters of 1943 the rate was lower than in the corresponding quarters of each of the 2 preceding years, but during the third quarter the rate was the same as in 1942 but lower than in 1941. In 22 of the 38 States with available data the infant mortality rate was lower than in 1942, in 11 States it was higher, and in 3 States the rate for the 2 years was the same The maternal mortality rate dropped from 3.2 for the first 9 months of 1941 to 2.6 in the corresponding period in 1942, and to 2.4 for the first 9 months of 1943. The rate was lower for each of the 3 quarters of the year 1943 than in the corresponding period in each of the 2 preceding years. Twenty-three of the 35 States with available data reported a decline from the 1942 rate, 9 showed an increase, and in 3 States the rate was the same as in 1942.

The influenza and pneumonia rates were both higher during the first 9 months of 1943 than in the same period in 1942. The influenza rate, however, was considerably below the rate for the first 9 months of 1941 and the pneumonia rate was about 5 percent below the 1941 rate. Of the 38 States with available data, 23 had higher influenza rates in 1943 than in 1942, and 24 States had higher pneumonia rates; 14 States had lower influenza rates in 1943 than in 1942 and 13 had lower pneumonia rates; in 1 State the rate for each disease was the same in 1943 and 1942. The incidence of influenza was somewhat above the normal level throughout the first 9 months of the year, but up to the end of that period there had been no indication of the outbreak that occurred later in the year. While the cases were of a mild type, the epidemic will no doubt be reflected in the death rates from influenza and pneumonia in the fourth quarter of the year.

The tuberculosis death rate was lower in the first 9 months of 1943 than in the same period of each of the 2 preceding years. A comparison by quarters, however, shows that the rate was relatively low during the first quarter of 1943 but was higher than in 1942 in both the second and third quarters. Twenty-one of the 38 States reporting had a higher tuberculosis rate during the first 9 months of 1943 than during the same period in 1942; in 16 States the rate was lower

in 1943 and in 1 State the rate was the same as in 1942. More than one-half of the States reporting higher rates in 1943 were located in the North Atlantic and North Central regions; no increases were reported from any State in the South Atlantic, East South Central, or Pacific regions.

There was an increase in each of the degenerative diseases during the first 9 months of 1943 over the first 9 months of 1942. The cancer and nephritis rates were about 1 percent higher than the corresponding rates for 1942, and the rates for diabetes and intracranial lesions of vascular origin were approximately 6 percent above the 1942 rates. For diseases of the heart the death rate increased from 290 per 100,000 for the first 9 months of 1942 to 311 for the same period in 1943.

Among the communicable diseases, whooping cough, cerebrospinal meningitis, and poliomyelitis had unusually high death rates during the first 9 months of 1943. Cerebrospinal meningitis maintained a relatively high level throughout the first 9 months of the year, with 33 States reporting higher death rates than in the same period of 1942. Poliomyelitis remained about normal during the first and second quarters of the year, but a serious outbreak started during the third quarter and continued to the end of the year. Twenty States reported a higher poliomyelitis death rate than in 1942; in 8 States the rate was lower and in the other 10 States the rate was the same as in 1942.

The death rate from all accidents for the first 9 months of 1943 was 67 per 100,000 population, as compared with 66 and 72 for the same months in 1942 and 1941, respectively. The automobile accident death rate was 14.1, as compared with 19.7 in 1942 and 26.0 in 1941. Twenty-one of the States reported a decline from 1942 in the death rate from all accidents and all of the 38 States reported a lower rate in 1943 from automobile accidents. The death rate from accidents other than automobile increased from 46 in the first 9 months of 1941 to 53 for the same period in 1943.

Provisional mortality from certain causes in the first 9 months of 1943, with comparative provisional data for the corresponding period in preceding years

State and period	All causes, rate per 1,000 population (annual basis)	Births (exclusive of stillbirths) per 1,000 population (annual basis)	Rate per 1,000 live births: Total infant mortality	Rate per 1,000 live births: Maternal mortality	Death rate per 100,000 population (annual basis): Typhoid and paratyphoid fever (1-2)	Dysentery (27)	Diarrhea and enteritis under 2 years (119)	Scarlet fever (8)	Diphtheria (10)	Whooping cough (9)	Measles (35)	Cerebrospinal (meningococcus) meningitis (6)	Acute poliomyelitis and polioencephalitis (36)	Acute infectious encephalitis (lethargic) (37)	Tuberculosis, all forms (13-22)	Syphilis (30)	Influenza (grippe) (33)	Pneumonia, all forms (107-109)	Cancer, all forms (45-55)	Diabetes mellitus (61)	Intracranial lesions of vascular origin (83)	Diseases of the heart (90-95)	Nephritis, all forms (130-132)	All accidents, including automobile accidents (169-195)	Automobile accidents (170 a, b, c)
38 STATES [1]																									
January-September:																									
1943	10.5	21.2	40	2.4	0.5	1.3	7.0	0.3	0.6	2.5	1.1	2.0	0.8	0.5	41.5	10.7	8.7	47	123	26.9	93	311	71	67	14.1
1942	10.1	19.7	41	2.6	.5	1.3	6.3	.3	.6	1.8	1.0	.6	.4	.4	42.0	11.0	7.9	44	122	25.5	88	290	70	66	19.7
1941	10.5	18.3	46	3.2	.8	(2)	7.3	.3	.6	2.8	1.9	.5	.5	.8	44.3	(2)	18.2	49	121	26.3	87	294	73	72	26.0
January-March:																									
1943	11.4	20.9	44	2.3	.3	.5	4.2	.5	.9	2.4	1.1	2.4	.2	.5	41.2	11.7	15.2	70	123	29.7	102	350	77	65	14.6
1942	11.1	18.8	46	2.7	.3	.8	3.4	.5	.9	1.9	1.5	.6	.2	.4	43.3	11.7	15.1	67	123	28.9	98	327	78	67	22.5
1941	11.8	17.2	53	3.2	.5	(2)	3.4	.5	8	2.8	1.5	.6	.3	.5	46.7	(2)	44.0	80	121	30.9	97	342	83	67	23.2
April-June:																									
1943	10.7	20.5	40	2.4	.4	1.1	6.2	.3	.5	2.7	1.7	2.5	.3	.5	44.5	10.8	8.2	47	124	27.8	95	318	75	67	12.0
1942	9.9	18.7	41	2.5	.5	1.1	5.5	.3	.3	1.8	1.3	.7	.2	.4	44.3	11.1	6.3	40	121	25.3	87	287	69	65	18.1
1941	10.2	17.6	45	3.3	.6	(2)	5.6	.4	.4	3.0	3.5	.5	.3	.5	46.4	(2)	8.4	40	121	25.8	87	289	73	69	24.1
July-September:																									
1943	9.5	22.1	37	2.4	.8	2.2	10.6	.2	.5	2.5	.4	1.2	1.8	.5	38.8	9.6	2.8	25	124	23.4	83	265	62	68	15.6
1942	9.4	21.4	37	2.6	.7	2.0	10.0	.2	.5	1.7	.2	.5	.7	.4	38.6	10.1	2.6	26	122	22.4	80	258	62	68	15.7
1941	9.5	20.0	40	3.0	1.2	(2)	12.7	.2	.7	2.6	.7	.4	1.0	1.4	39.9	(2)	2.6	26	120	27.2	78	252	63	79	30.4
Industrial policyholders: [3]																									
1943	7.9	----	----	----	.3	----	[4] 4.5	.4	.7	1.3	.7	----	----	----	40.9	9.9	5.6	36	106	28.5	66	[5] 231	[6] 51	52	12.2
1942	7.3	----	----	----	.3	----	[4] 4.2	.4	.5	1.0	.6	----	----	----	42.4	10.9	4.3	29	105	28.1	60	[5] 213	[6] 50	51	17.3
1941	7.6	----	----	----	.4	----	[4] 4.4	.5	.6	1.3	1.0	----	----	----	43.8	11.4	9.1	33	104	27.8	61	[5] 211	[6] 52	51	20.2
Alaska:																									
1943	19.5	20.8	136	2.5	(7)	(7)	1.7	1.7	3.5	63.9	15.5	1.7	(7)	(7)	357.6	(7)	44.9	161	81	1.7	82	181	25	314	8.8
1942	18.3	25.4	111	2.8	(7)	(7)	8.8	(7)	1.8	15.8	52.7	3.5	(7)	(7)	356.6	(7)	22.8	112	81	7.0	63	190	30	297	14.4
1941	19.3	27.7	100	5.2	3.6	(8)	5.4	(7)	(7)	7.1	59.0	1.8	3.6	(7)	443.3	(8)	80.4	127	95	5.4	82	202	36	180	(7)
Canal Zone:																									
1943	11.3	20.8	46	5.0	(7)	(7)	(7)	(7)	(7)	(7)	(7)	(7)	(7)	(7)	51.6	23.2 [4]	(7)	18	57	20.6	36	119	41	441	21.5

le:																									
1943	10.9	21.8	48	2.2	.2	1.1	11.4	.7	1.5	1.5	3.8	3.1	2.5	.3	52.6	9.8	11.6	71	121	16.7	86	268	72	98	14.5
1942	11.1	19.9	52	2.0	.5	1.0	10.6	1.1	1.2	2.9	1.8	.7	.5	.6	51.7	10.1	8.5	76	120	17.7	96	266	76	92	26.5
1941	10.8	19.1	51	3.0	.8	(2)	10.9	.8	1.9	6.0	1.7	.6	.7	2.3	51.6	(2)	21.8	64	110	16.5	84	275	79	70	22.7
necticut:																									
1943	9.7	19.9	28	1.5	(7)	.2	3.5	.1	(7)	.4	.4	1.4	1.1	.6	31.6	6.7	2.9	32	138	28.9	85	330	52	54	10.9
1942	8.9	16.8	30	2.2	.1	(7)	2.5	(7)	(7)	.4	.3	.4	(7)	.1	33.0	6.4	1.7	34	130	27.4	79	301	58	54	13.9
1941	9.0	13.1	32	2.7	.2	(2)	1.8	.2	(7)	.5	.1	.2	.2	(7)	32.0	(2)	5.4	29	129	31.2	77	307	62	58	19.1
aware:																									
1943	11.3	20.6	39	2.3	.5	(7)	7.2	(7)	(7)	5.8	.5	8.6	(7)	1.0	34.1	14.4	8.6	65	110	35.5	110	354	132	62	17.3
1942	11.6	19.1	38	1.5	(7)	(7)	9.6	1.9	(7)	.5	(7)	(7)	(7)	1.0	51.8	12.5	5.8	50	125	30.7	104	370	128	74	24.0
1941	11.8	18.2	44	1.9	(7)	(2)	8.8	1.0	(7)	2.5	2.0	(7)	1.0	(7)	54.4	(2)	13.7	53	120	27.9	94	352	131	81	28.6
trict of Columbia:																									
1943	10.6	26.2	41	1.8	.3	.6	13.0	1.1	(7)	5.3	.5	3.6	.3	(7)	57.0	14.9	3.9	56	135	23.2	58	282	91	59	8.7
1942	10.2	23.2	45	2.5	.3	.2	16.5	.2	.3	2.6	(7)	1.9	.2	(7)	57.9	19.5	2.3	57	126	25.8	67	262	86	63	14.5
1941	11.4	23.5	51	2.7	.7	(2)	17.5	(7)	.3	1.8	.7	.7	1.2	.2	57.9	(2)	4.7	68	141	24.3	80	284	98	69	20.6
rida:																									
1943	9.5	17.5	48	4.8	.9	1.5	7.7	.2	1.0	2.6	.4	1.8	.3	.4	33.6	13.5	17.9	42	80	17.3	89	206	69	111	18.3
1942	10.5	17.3	52	4.8	1.4	1.8	7.8	.1	1.1	2.3	3.1	.7	.2	.1	40.5	18.0	13.5	47	90	18.0	102	244	72	93	25.4
1941	11.7	17.7	54	6.7	1.5	(2)	8.8	.1	.9	1.9	1.1	.7	1.9	.4	45.8	(2)	31.5	49	100	20.8	110	274	86	110	38.7
rgia:																									
1943	8.3	22.3	49	3.8	.7	2.5	9.6	.2	1.0	6.0	.8	1.2	.0	.2	37.0	12.3	14.3	47	60	12.3	86	160	89	57	15.1
1942	8.5	20.7	52	4.0	.7	2.7	8.6	.1	1.0	3.2	2.3	.5	.4	.1	37.8	13.5	14.8	49	62	10.8	84	155	94	59	19.3
1941	9.7	20.6	60	4.5	1.7	(2)	15.3	.3	1.1	4.7	6.0	.5	1.1	.1	42.1	(2)	37.9	53	63	11.7	93	179	102	64	23.1
waii:																									
1943	7.6	26.3	41	1.5	.3	.3	7.0	(7)	.3	4.2	(7)	.6	(7)	.3	57.1	13.9	5.4	39	77	18.1	47	131	82	119	20.9
1942	7.5	23.5	40	2.7	1.8	(7)	6.1	.3	.3	4.0	.3	.6	(7)	(7)	58.8	13.2	3.1	47	66	16.8	47	131	60	94	19.0
1941	7.0	22.7	42	2.5	1.6	(2)	9.9	(7)	.6	2.2	1.6	(7)	.6	.3	57.5	(2)	3.1	39	76	19.3	52	127	51	69	20.2
nois:																									
1943	11.5	19.6	34	2.0	.2	.4	3.8	.3	1.1	1.5	.9	1.7	2.2	.5	43.3	10.8	4.9	38	157	32.2	92	394	87	62	14.6
1942	10.9	17.7	35	2.0	.3	.7	2.8	.3	.7	1.3	.6	.2	.3	.3	40.8	10.5	4.4	39	147	30.4	83	350	81	65	21.2
1941	10.7	16.3	35	2.6	.4	(2)	3.2	.5	.6	1.1	1.4	.2	.3	.4	45.1	(2)	7.2	41	144	29.0	79	340	87	74	29.5
liana:																									
1943	11.2	20.7	40	2.3	.3	.4	8.8	.5	.5	3.8	2.6	1.4	.5	.5	33.6	8.8	17.9	55	122	15.2	142	260	86	71	17.3
1942	10.5	18.8	38	2.8	.2	.4	6.4	.5	3	2.0	.4	.1	.6	.3	35.4	9.7	15.6	47	119	12.8	131	243	76	76	27.6
1941	11.1	17.4	38	3.0	.6	(2)	5.8	.7	.7	1.6	2.0	.5	.3	.2	37.4	(2)	23.0	49	121	15.1	138	272	66	91	39.7
ra:																									
1943	10.8	20.4	34	1.7	.1	.2	2.4	.9	.5	1.8	1.0	1.0	.7	.3	16.1	7.0	8.1	39	149	28.7	120	336	64	71	11.5
1942	10.1	19.2	34	2.2	(7)	.2	2.4	.3	.3	1.2	.8	1	.1	.3	16.1	6.3	8.6	38	148	25.6	113	293	62	68	17.0
1941	9.8	17.0	38	2.8	.2	(2)	1.6	.4	.3	1.7	.6	.4	.2	.8	14.0	(2)	15.4	43	133	25.6	102	285	61	67	22.8
nsas:																									
1943	10.7	19.8	34	2.2	.2	.4	2.7	1.0	.7	2.0	.5	1.6	4.1	1.3	20.9	9.9	12.4	35	130	28.1	116	299	86	89	16.2
1942	10.4	17.9	37	2.6	.2	.5	4.1	.4	.1	1.1	1.6	.3	.8	1.0	25.8	11.1	15.1	32	128	27.2	114	292	87	78	21.3
1941	10.7	17.2	39	2.2	.3	(2)	2.5	.3	.4	4.1	2.4	.6	.3	1.6	24.8	(2)	26.3	38	125	24.9	108	285	98	81	30.1
ntucky:																									
1943	9.8	22.7	51	2.2	1.4	5.6	15.2	.4	.8	4.4	4.6	2.7	.4	.5	61.7	5.6	17.3	60	83	14.2	95	241	73	56	11.8
1942	9.7	21.3	53	3.1	1.5	5.5	13.9	.9	1.4	4.0	1.1	1.0	.9	.2	65.0	9.4	16.3	58	85	14.9	90	226	80	70	18.3
1941	10.7	21.3	60	4.6	2.5	(7)	20.9	1.1	.9	8.5	6.9	1.0	.9	.1	71.4	(2)	45.3	61	85	16.0	96	227	77	77	27.9

footnotes at end of table.

Provisional mortality from certain causes in the first 9 months of 1943, with comparative provisional data for the corresponding period in preceding years—Continued

State and period	All causes, rate per 1,000 population (annual basis)	Births (exclusive of stillbirths) per 1,000 population (annual basis)	Rate per 1,000 live births: Total infant mortality	Rate per 1,000 live births: Maternal mortality	Death rate per 100,000 population (annual basis): Typhoid and paratyphoid fever (1-2)	Dysentery (27)	Diarrhea and enteritis under 2 years (119)	Scarlet fever (8)	Diphtheria (10)	Whooping cough (9)	Measles (35)	Cerebrospinal (meningococcus) meningitis (6)	Acute poliomyelitis and polioencephalitis (36)	Acute infectious encephalitis (lethargic) (37)	Tuberculosis, all forms (13-22)	Syphilis (30)	Influenza (grippe) (33)	Pneumonia, all forms (107-109)	Cancer, all forms (45-55)	Diabetes mellitus (61)	Intracranial lesions of vascular origin (83)	Diseases of the heart (90-95)	Nephritis, all forms (130-132)	All accidents, including automobile accidents (169-195)	Automobile accidents (170 a, b, c)
38 States—Continued																									
Louisiana:																									
1943	9.3	22.7	46	3.3	1.5	1.4	6.7	(7)	0.8	4.6	0.6	0.9	0.5	0.2	52.0	18.1	11.8	50	83	15.7	71	233	65	54	15.5
1942	9.1	20.4	53	3.6	1.8	1.6	8.0	.1	1.2	2.5	1.5	.8	.5	.2	48.6	21.1	12.1	49	82	15.6	65	216	67	47	17.6
1941	9.9	20.6	62	4.7	2.9	(2)	10.0	.2	1.0	2.0	.3	.7	.3	.1	56.9	(2)	30.1	59	83	15.5	63	244	84	70	26.6
Maine:																									
1943	13.5	24.0	49	2.3	.5	(7)	9.6	.2	.5	3.0	.3	7.3	.5	.5	32.2	8.0	17.4	65	159	28.7	144	403	99	78	13.6
1942	12.5	20.9	43	2.0	.3	.2	7.8	1.0	.3	2.3	1.8	2.6	.3	.6	32.9	6.1	10.7	53	153	29.7	128	365	82	83	19.1
1941	12.7	18.7	48	2.7	.5	(2)	9.1	.2	.3	2.1	1.3	1.3	.3	.5	31.9	(2)	23.6	57	154	32.6	125	380	93	76	23.6
Maryland:																									
1943	11.2	21.4	42	1.7	.3	.8	10.7	.2	.4	2.5	.4	4.8	(7)	.4	63.9	14.9	4.1	56	126	28.3	87	334	107	71	16.0
1942	11.0	19.3	46	1.9	.4	.9	11.0	.1	.1	1.4	.8	2.3	(7)	.5	69.3	17.7	4.8	53	126	27.3	86	348	103	76	21.8
1941	11.6	18.1	53	1.9	.8	(2)	10.6	.1	(7)	4.2	.8	1.1	.2	.6	75.2	(2)	11.1	59	137	30.0	89	332	114	75	28.1
Massachusetts:																									
1943	12.7	(2)	(2)	(2)	.2	.1	4.8	.6	.2	.9	.6	3.0	.5	.2	43.0	7.0	3.3	71	175	38.5	114	456	65	70	10.1
1942	11.3	(2)	(2)	(2)	.8	.1	2.3	.3	.2	.8	.5	.8	(7)	.6	38.4	5.7	2.3	53	172	35.7	106	400	59	61	12.1
1941	11.8	(2)	(2)	(2)	.0	(2)	4.6	.3	.1	1.1	.1	.6	.0	.4	38.3	(2)	8.2	64	175	36.2	105	430	65	62	15.6
Michigan:																									
1943	10.4	23.7	38	1.9	.2	.4	5.2	.2	.3	2.2	2.0	2.2	.5	.2	35.5	11.0	6.5	50	127	27.4	97	324	54	63	16.5
1942	9.4	21.7	38	2.1	.1	.6	4.0	.5	.3	1.2	.2	.3	.2	.3	34.2	9.9	3.3	41	115	25.4	85	283	48	68	25.4
1941	9.8	19.4	39	2.9	.2	(2)	4.4	.6	.3	1.8	1.6	.1	.3	.2	32.7	(2)	9.6	43	116	25.8	87	290	53	81	36.9
Minnesota:																									
1943	10.4	23.4	31	1.5	(7)	.1	1.8	.4	.6	1.1	.7	.7	.5	.7	29.7	7.2	5.1	49	155	28.4	107	305	42	65	10.4
1942	9.7	21.5	30	1.5	.2	.3	2.7	.2	.3	.7	.6	.2	.3	.6	26.8	6.7	7.6	47	145	26.5	94	281	43	66	17.9
1941	9.7	20.0	34	2.1	.1	(2)	2.7	.1	.3	1.1	1	3	1.1	3.2	29.2	(2)	11.1	48	144	25.1	82	264	40	77	22.5

Missouri:[8]																									
1943	12.4	21.9	37	2.0	.3	.7	2.8	.8	1.5	1.8	2.6	2.9	.5	.7	48.2	15.1	13.4	89	139	28.6	109	367	120	69	12.4
1942	12.1	18.9	41	2.8	.4	.5	3.3	.5	.7	1.2	2.1	.5	.3	.4	45.8	14.8	13.6	88	144	25.1	106	328	118	72	20.2
1941	12.6	20.5	43	2.3	.6	(2)	2.3	.8	1.1	5.8	5.6	.6	.3	.7	51.0	(2)	53.4	101	133	30.2	104	329	114	78	24.7
Montana:																									
1943	11.4	23.5	41	1.8	.5	1.6	4.9	.5	1.1	3.3	1.6	.5	.8	1.1	42.1	9.1	7.4	52	122	19.5	87	297	63	134	19.8
1942	10.4	22.1	37	2.1	(7)	.3	3.4	.8	1.0	2.3	1.0	1.3	(7)	1.0	38.4	11.9	6.5	47	124	14.0	100	276	60	90	21.3
1941	10.7	21.6	38	1.7	.2	(2)	4.5	1.7	2.9	1.2	.2	.2	1.0	3.5	39.8	(2)	21.2	50	116	14.7	100	257	60	104	34.8
Nebraska:																									
1943	10.4	20.4	36	1.8	(7)	.1	1.6	.7	.5	2.3	1.5	1.0	2.0	.1	16.8	8.3	11.1	40	134	31.8	100	291	77	73	14.5
1942	9.6	18.4	32	1.8	.1	.2	1.9	.4	.6	1.2	.7	.3	1.5	.3	13.7	8.0	11.1	34	138	27.0	99	273	67	67	16.8
1941	9.7	17.2	35	2.7	.2	(2)	1.4	.1	.3	2.8	.4	.6	1.0	1.6	15.9	(2)	28.5	37	128	25.5	106	241	68	65	19.3
Nevada:																									
1943	10.8	20.6	49	3.0	(7)	.9	4.4	(7)	(7)	2.6	(7)	2.6	2.6	(7)	42.2	17.6	4.4	71	79	13.2	64	267	45	177	35.1
1942	12.4	18.4	59	.5	2.0	5.9	10.8	1.0	(7)	6.9	2.0	2.0	1.0	2.0	54.1	11.8	5.9	56	104	12.8	88	314	55	206	73.4
1941	11.7	16.9	44	3.9	3.3	(2)	4.3	(7)	(7)	1.1	(7)	(7)	(7)	1.1	51.1	(2)	7.6	40	102	14.1	65	285	50	212	95.6
New Jersey:																									
1943	11.3	19.6	33	1.6	.3	.1	4.2	.3	.3	1.0	.7	3.1	.2	.5	45.6	8.2	6.4	44	144	36.9	98	392	70	63	15.4
1942	10.6	18.1	32	1.9	.1	.4	2.7	.2	.1	.9	.2	.5	.5	.5	43.7	9.3	3.2	39	150	34.3	89	357	67	62	17.3
1941	10.7	15.5	36	2.2	.2	(2)	2.9	.2	.2	.7	.8	.3	.3	.3	43.6	(2)	6.3	43	131	35.4	94	352	75	63	21.5
New Mexico:																									
1943	10.4	29.7	85	4.8	.5	14.6	44.0	.2	1.7	5.9	3.7	.7	1.2	.2	73.7	11.4	11.9	56	70	10.1	42	127	46	126	18.3
1942	9.8	26.5	94	3.9	1.0	9.1	32.3	(7)	1.5	7.6	7.8	.8	1.8	1.0	58.4	10.4	14.9	66	53	6.8	40	125	47	88	27.5
1941	10.8	28.0	97	3.8	2.3	(2)	48.9	.3	2.0	11.6	11.6	.3	.3	.5	68.6	(2)	18.7	57	54	11.8	44	120	50	100	41.8
New York:																									
1943	12.3	20.0	32	2.0	.1	.2	3.7	.3	.2	1.3	.9	2.8	.2	1.2	50.7	13.9	3.0	50	172	41.9	83	453	61	60	12.0
1942	11.3	18.0	32	2.2	.2	.2	3.1	.2	.1	1.1	.1	.8	.2	.9	45.2	14.2	1.8	40	171	40.1	75	40	57	61	15.8
1941	11.2	16.1	32	2.3	.2	(2)	2.8	.2	.1	.7	.5	.5	.3	.9	48.0	(2)	4.8	46	160	41.4	73	396	61	63	18.3
North Carolina:																									
1943	8.2	28.4	46	3.5	.6	1.6	12.2	.1	1.0	3.1	.6	1.6	.3	.1	40.0	6.8	11.0	47	63	12.1	86	171	78	60	17.3
1942	8.2	23.9	51	3.8	.5	1.8	13.3	.4	.9	3.2	2.0	.5	.3	.1	46.1	7.7	8.5	48	60	12.6	86	163	81	66	24.6
1941	9.1	24.0	61	4.5	1.0	(2)	19.7	.3	1.4	6.1	3.4	.3	.3	.4	50.5	(2)	31.9	59	61	12.9	81	164	86	70	33.5
North Dakota:																									
1943	8.6	26.2	39	2.5	.7	.2	3.2	(7)	.7	.2	.7	1.2	.2	2.2	23.4	3.9	5.2	36	110	23.4	82	232	54	59	11.3
1942	7.8	21.4	38	2.8	.2	.5	6.6	.5	.2	2.3	2.1	.2	.2	2.1	23.1	3.0	4.3	36	100	20.8	81	189	40	43	14.9
1941	8.7	22.7	39	2.5	(7)	(2)	3.9	.4	1.3	2.4	.4	(7)	.2	25.5	21.4	(2)	13.7	38	93	22.0	77	203	50	66	16.6
Ohio:																									
1943	11.6	20.7	40	2.1	.6	.3	7.5	.5	.5	2.1	.9	1.2	.2	.5	40.8	12.5	11.5	50	141	34.3	119	347	73	76	16.9
1942	10.9	19.2	39	2.0	.3	.3	6.0	.4	.2	2.1	.5	.1	.3	.2	41.2	11.7	9.0	46	135	30.9	105	315	76	81	27.2
1941	11.2	17.2	41	2.6	.3	(2)	7.0	.3	.3	2.7	2.1	.2	.7	.7	42.5	(2)	16.6	44	137	29.0	104	309	73	87	32.5
Oklahoma:																									
1943	8.8	19.8	48	2.8	1.2	2.4	5.8	.3	1.0	4.4	.2	1.9	1.5	.5	41.5	9.8	10.6	43	88	16.7	92	191	56	66	12.5
1942	9.6	22.0	41	3.7	1.6	3.2	4.7	.2	1.5	2.5	6.0	1.6	.7	.5	49.2	7.3	13.6	50	96	16.8	91	204	58	75	18.2
1941	9.0	20.1	51	2.9	1.6	(2)	4.5	.3	2.4	6.5	1.1	.4	.6	.4	47.6	(2)	28.8	54	85	15.6	80	191	58	63	21.8
Pennsylvania:																									
1943	11.4	21.4	35	1.9	.3	.4	4.3	.3	.3	2.1	.7	1.9	.2	.0	39.5	10.4	7.5	46	134	35.6	95	364	90	53	11.3
1942	10.9	20.5	36	1.4	.3	.2	3.7	.4	.1	1.3	.5	6.7	.2	.2	39.6	10.8	6.0	41	129	33.3	87	341	85	52	15.4
1941	10.9	18.4	38	2.4	.5	(2)	4.4	.3	.3	1.6	1.3	.3	.7	.7	40.2	(2)	13.0	45	125	35.2	86	342	86	58	18.3
Rhode Island:																									
1943	11.9	20.5	42	2.1	(7)	.2	7.2	.5	.4	1.6	.2	8.0	1.1	1.1	39.0	9.4	4.0	53	155	43.5	92	401	97	64	9.2
1942	10.5	18.2	40	2.2	.2	(7)	9.6	.2	.5	1.1	.7	.4	.2	.4	37.7	9.4	2.3	49	141	35.5	94	354	79	55	10.6
1941	10.9	16.0	37	2.3	(7)	(2)	2.6	.4	(7)	.2	.2	.4	.6	.4	38.0	(2)	6.8	45	148	38.6	83	380	103	50	10.1

See footnotes at end of table.

Provisional mortality from certain causes in the first 9 months of 1943, with comparative provisional data for the corresponding period in preceding years—Continued

State and period	All causes, rate per 1,000 population (annual basis)	Births (exclusive of stillbirths) per 1,000 population (annual basis)	Rate per 1,000 live births: Total infant mortality	Rate per 1,000 live births: Maternal mortality	Death rate per 100,000 population (annual basis): Typhoid and paratyphoid fever (1–2)	Dysentery (27)	Diarrhea and enteritis under 2 years (119)	Scarlet fever (8)	Diphtheria (10)	Whooping cough (9)	Measles (35)	Cerebrospinal (meningococcus) meningitis (6)	Acute poliomyelitis and polioencephalitis (36)	Acute infectious encephalitis (lethargic) (37)	Tuberculosis, all forms (13–22)	Syphilis (30)	Influenza (grippe) (33)	Pneumonia, all forms (107–109)	Cancer, all forms (45–55)	Diabetes mellitus (61)	Intracranial lesions of vascular origin (83)	Diseases of the heart (90–95)	Nephritis, all forms (130–132)	All accidents, including automobile accidents (169–195)	Automobile accidents (170 a, b, c)
38 STATES—Continued																									
South Carolina:																									
1943	7.2	24.2	48	4.2	1.4	2.8	6.7	0.1	1.0	3.2	0.5	1.7	0.3	0.1	31.4	13.1	12.1	41	43	10.4	73	130	76	55	12.2
1942	8.1	21.0	61	5.5	2.1	1.7	7.6	(7)	2.1	4.0	2.1	.7	.3	.1	36.0	12.2	13.9	51	50	11.1	84	154	92	56	19.0
1941	10.4	22.6	79	6.2	2.6	(2)	9.8	.3	1.5	12.0	8.9	1.2	.3	.1	44.3	(2)	39.1	68	55	13.2	92	183	89	76	31.9
South Dakota:																									
1943	9.4	23.7	33	1.0	.2	.2	2.3	.9	1.1	2.3	5.9	.7	(7)	1.6	28.0	3.6	8.7	44	111	21.4	88	223	54	87	10.3
1942	9.2	20.8	39	2.4	.9	(7)	3.2	.2	3.2	6.4	(7)	.9	(7)	.5	28.7	5.5	6.6	46	112	20.8	93	222	54	67	16.4
1941	9.4	20.1	43	1.9	.4	(2)	2.6	.2	2.2	4.4	.2	.4	.2	7.2	29.8	(2)	17.8	45	104	26.3	88	217	58	74	22.0
Tennessee:																									
1943	9.4	23.7	45	3.2	1.3	3.2	10.2	.2	1.1	6.7	1.6	2.0	.3	.3	65.6	12.2	17.8	52	83	13.1	92	189	64	70	15.9
1942	9.1	20.1	51	3.4	.6	2.7	8.4	.5	.8	2.2	1.5	.6	1.0	.5	71.1	12.7	17.5	55	79	12.5	83	179	61	60	16.8
1941	9.8	19.3	58	3.9	1.5	(2)	12.9	.3	1.0	6.1	5.5	1.1	1.1	.6	81.0	(2)	39.4	65	89	12.5	80	176	65	61	20.5
Texas:																									
1943	8.6	(2)	(2)	(2)	1.2	5.8	19.6	.1	1.7	4.3	.6	.9	2.7	.2	46.7	11.3	9.8	36	78	12.8	68	186	58	78	16.5
1942	8.5	(2)	(2)	(2)	1.4	(2)	17.1	.3	1.6	2.3	2.0	.6	.4	.2	53.3	(2)	13.7	40	78	12.9	61	183	58	71	21.6
1941	9.2	(2)	(2)	(2)	2.1	(2)	16.6	.1	1.9	3.8	1.5	.4	.8	.3	55.6	(2)	34.3	47	78	12.9	59	188	62	74	28.5
Utah:																									
1943	8.1	28.3	32	1.6	(7)	(7)	2.1	(7)	(7)	1.3	2.7	2.7	3.8	(7)	10.3	4.2	6.1	34	81	17.7	58	234	45	81	17.7
1942	8.4	27.0	33	2.0	.5	.5	2.8	.7	(7)	.7	1.6	(7)	(7)	.7	11.3	4.9	8.1	29	89	13.7	59	251	50	88	28.0
1941	8.0	24.0	29	1.3	.7	(2)	2.8	(7)	(7)	1.9	(7)	.2	(7)	.7	10.9	(2)	10.4	28	84	20.4	59	240	51	80	36.6
Vermont:																									
1943	13.0	21.0	40	2.2	(7)	.4	2.9	(7)	(7)	2.9	5.7	1.6	(7)	(7)	32.8	6.6	17.2	64	149	31.6	121	352	79	65	9.9
1942	11.4	19.2	47	1.8	.4	.4	3.5	.4	.4	3.9	.8	.4	.8	(7)	32.5	4.7	7.4	49	145	27.8	123	367	76	49	10.2
1941	11.9	18.9	47	2.0	.8	(2)	4.6	.4	(7)	(7)	.8	1.1	.4	(7)	38.9	(2)	18.3	49	145	29.0	117	377	89	59	21.4

Virginia:																									
1943	8.8	21.0	49	3.0	.5	2.6	7.6	.3	.7	3.5	.4	3.4	.3	.5	43.9	12.5	10.2	47	72	14.5	90	210	78	70	16.9
1942	9.5	19.9	57	3.3	.8	3.6	11.7	.4	.8	3.3	.6	1.5	.3	.4	53.0	14.6	11.5	53	78	15.8	94	218	77	74	22.7
1941	10.8	20.0	69	4.1	.9	(2)	14.7	.3	.9	7.6	7.5	1.4	.5	.1	58.7	(2)	32.6	59	81	18.8	97	243	95	86	33.7
Washington:[3]																									
1943	11.8	20.1	40	1.8	.1	.4	2.9	.7	1.5	1.2	4.0	2.7	.6	1.6	37.8	11.4	11.2	67	123	25.7	110	372	62	94	18.4
1942	10.8	17.7	37	2.4	.1	.1	1.9	.6	.4	1.5	.3	.5	.1	1.1	37.8	12.0	8.7	52	129	27.5	111	327	67	81	24.9
1941	12.1	15.2	38	2.1	.2	(2)	.7	.1	.6	1.8	.2	.3	.2	.6	41.6	(2)	13.7	41	130	24.7	98	330	67	87	28.4
Wisconsin:																									
1943	10.4	21.6	34	2.1	.2	.3	2.8	.6	.2	1.6	1.2	1.1	.5	.7	25.8	6.3	7.5	39	143	33.5	103	319	61	68	12.4
1942	9.6	19.3	32	2.0	.0	.1	2.1	.8	.1	1.4	.3	.3	.2	.5	24.4	5.1	6.0	35	137	26.3	98	299	51	64	19.8
1941	9.7	17.5	36	2.7	.3	(2)	2.2	.6	.0	.9	.9	.1	.3	.7	25.8	(2)	12.3	38	132	28.6	91	293	54	71	25.1
Wyoming:																									
1943	8.5	21.7	35	1.2	.5	(2)	2.0	.5	(7)	.5	2.6	1.0	2.6	2.1	19.3	(2)	9.4	43	85	15.1	55	229	68	100	15.6
1942	8.6	20.4	50	3.1	(7)	(2)	3.7	1.6	.5	2.6	1.6	1.0	1.0	(7)	15.9	10.6	11.7	37	74	16.5	59	219	64	104	28.2
1941	8.9	20.0	47	3.0	1.1	(2)	3.2	.5	2.1	1.6	1.1	1.6	(7)	3.2	13.3	(2)	26.1	45	83	11.7	68	214	69	117	50.6

[1] The District of Columbia is included as a State. Includes all of the States listed below except Idaho, Washington, and Missouri.
[2] Data not available.
[3] These data are taken from the October 1943 Statistical Bulletin published by the Metropolitan Life Insurance Co. The rates for 1943 are subject to correction as they are based on provisional estimates of lives exposed to risk. Data do not include all diseases reported to the Public Health Service.
[4] Classified as diarrhea and enteritis, age not specified.
[5] International List (1940) titles 92, 93 c, d, e, 94 a, b, and 95 only.
[6] Chronic nephritis only.
[7] No deaths reported.
[8] 6 months only.

PREVALENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED APRIL 29, 1944

Summary

Following an increase last week, the incidence of meningococcus meningitis again declined. A total of 449 cases was reported, the smallest weekly total since December of last year, as compared with 491 last week, 592 for the corresponding week last year, and a 5-year (1939–43) median of 56. Nine States reporting 18 or more cases currently (last week's figures in parentheses) are as follows: *Increases*—Pennsylvania 34 (33), Ohio 41 (35), Michigan 23 (15), Missouri 22 (15); *decreases*—New Jersey 21 (23), Illinois 43 (53), Texas 18 (23), California 22 (23); *no change*—New York 56 (56). The peak week of incidence of this disease in past years has rarely occurred later than the middle of April. The total number of cases reported to date this year is 9,083, as compared with 8,213 for the same period last year.

The incidence of measles declined slightly during the week, while that of scarlet fever increased. Totals reported currently are 29,995 cases of measles and 7,439 of scarlet fever, 18 and 80 percent, respectively, above the corresponding medians, and, with one exception as regards measles, more than for the corresponding week of any of the past 5 years. Cumulative totals to date are 428,568 for measles and 105,596 for scarlet fever, as compared with 5-year medians of 305,155 and 67,902, respectively.

Current reports of diphtheria, influenza, smallpox, typhoid fever, and whooping cough continue below the respective median expectancies. A total of 18 cases of poliomyelitis was reported, as compared with 26 last week and a 5-year median of 17. One case of psittacosis was reported, in Pennsylvania, and 5 cases of Rocky Mountain spotted fever, all of which occurred in western States.

Deaths recorded in 93 large cities of the United States totaled 9,332, as compared with 9,288 for the preceding week and a 3-year (1941–43) average of 9,070. The cumulative total for the year is 169,772, as compared with 171,544 for the same period last year.

Telegraphic morbidity reports from State health officers for the week ended April 29, 1944, and comparison with corresponding week of 1943 and 5-year median

In these tables a zero indicates a definite report, while leaders imply that, although none was reported, cases may have occurred.

Division and State	Diphtheria			Influenza			Measles			Meningitis, meningococcus		
	Week ended—		Median 1939–43	Week ended—		Median 1939–43	Week ended—		Median 1939–43	Week ended—		Median 1939–43
	April 29, 1944	May 1, 1943		April 29, 1944	May 1, 1943		April 29, 1944	May 1, 1943		April 29, 1944	May 1, 1943	
NEW ENGLAND												
Maine	0	0	1	15	1	1	441	24	84	4	7	1
New Hampshire	0	0	0	3	......	......	35	54	31	0	1	0
Vermont	0	0	0	......	......	......	109	278	84	0	3	0
Massachusetts	2	4	3	......	......	......	1,017	1,688	1,190	12	30	2
Rhode Island	1	0	1	......	......	......	98	4	26	1	12	0
Connecticut	0	1	0	......	......	1	527	481	447	6	11	0
MIDDLE ATLANTIC												
New York	9	20	20	[1] 3	[1] 8	[1] 12	1,836	3,145	1,705	56	76	4
New Jersey	5	4	5	2	13	10	1,505	2,485	817	21	47	2
Pennsylvania [2]	9	18	18	2	2	......	956	2,010	1,297	34	36	7
EAST NORTH CENTRAL												
Ohio	4	10	8	19	19	12	698	568	380	41	17	1
Indiana	5	6	6	5	2	11	198	688	148	12	12	0
Illinois	6	22	22	7	13	12	918	1,900	620	43	29	3
Michigan [3]	8	7	2	5	1	14	1,078	2,603	674	23	23	0
Wisconsin	4	1	1	61	26	52	2,816	1,703	1,183	9	15	1
WEST NORTH CENTRAL												
Minnesota	3	3	3	......	4	4	804	322	322	1	6	0
Iowa	2	2	3	10	......	1	212	334	273	6	1	0
Missouri	0	1	1	1	3	3	308	27[illegible]	276	22	22	2
North Dakota	1	0	1	1	4	9	70	67	45	0	1	0
South Dakota	1	0	0	......	......	1	30	104	20	0	0	0
Nebraska	0	1	3	3	7	7	255	270	270	2	1	0
Kansas	1	3	6	7	2	7	723	532	616	9	8	0
SOUTH ATLANTIC												
Delaware	0	0	0	......	......	......	15	110	13	2	3	0
Maryland [3]	20	6	3	4	10	10	609	327	348	6	22	2
District of Columbia	0	0	0	2	1	......	229	132	132	4	5	2
Virginia	2	2	8	108	221	221	613	381	381	10	26	1
West Virginia	2	0	2	13	9	15	446	133	78	4	5	2
North Carolina	6	4	5	1	7	14	1,701	321	686	5	15	1
South Carolina	6	4	4	267	387	328	371	63	63	4	13	1
Georgia	3	1	6	5	29	29	79	352	211	10	7	0
Florida	7	3	3	14	15	9	289	67	107	2	7	0
EAST SOUTH CENTRAL												
Kentucky	3	2	5	3	8	8	169	309	142	12	16	2
Tennessee	3	2	3	28	29	60	232	376	168	14	7	2
Alabama	9	7	7	45	149	93	323	141	178	6	8	3
Mississippi [3]	5	5	5	......	......	......	......	......	......	5	7	1
WEST SOUTH CENTRAL												
Arkansas	3	4	4	52	39	92	241	152	133	2	1	1
Louisiana	2	1	6	4	1	3	102	48	67	8	2	1
Oklahoma	5	8	2	90	32	76	382	42	184	2	2	2
Texas	29	20	22	711	721	721	4,182	739	1,260	18	21	2
MOUNTAIN												
Montana	0	2	2	12	22	14	115	197	158	1	0	0
Idaho	0	0	0	......	2	1	33	209	37	0	4	0
Wyoming	0	0	0	......	2	1	67	187	86	1	0	0
Colorado	13	12	9	22	27	14	246	748	445	2	4	0
New Mexico	2	0	1	7	5	1	111	12	30	0	0	0
Arizona	3	0	0	58	88	88	322	83	89	0	3	0
Utah	0	0	1	......	5	7	44	154	154	0	5	0
Nevada	0	0	0	100	......	......	19	33	0	1	0	0
PACIFIC												
Washington	1	6	1	......	3	......	256	458	458	5	8	0
Oregon	3	4	4	20	35	17	163	362	362	1	9	0
California	28	15	15	24	80	81	4,002	854	854	22	34	2
Total	211	211	237	1,734	2,032	2,032	29,995	26,526	25,479	449	592	56
17 weeks	3,994	4,551	4,878	328,181	68,336	138,406	428,568	314,834	305,155	9,083	8,213	854

See footnotes at end of table.

Telegraphic morbidity reports from State health officers for the week ended April 29, 1944, and comparison with corresponding week of 1943 and 5-year median—Con.

Division and State	Poliomyelitis			Scarlet fever			Smallpox			Typhoid and paratyphoid fever[4]		
	Week ended—		Median 1939–43	Week ended—		Median 1939–43	Week ended—		Median 1939–43	Week ended—		Median 1939–43
	April 29, 1944	May 1, 1943		April 29, 1944	May 1, 1943		April 29, 1944	May 1, 1943		April 29, 1944	May 1, 1943	
NEW ENGLAND												
Maine	0	0	0	73	23	12	0	0	0	2	0	0
New Hampshire	0	0	0	20	7	2	0	0	0	0	0	0
Vermont	0	0	0	10	6	7	0	0	0	1	0	0
Massachusetts	1	0	0	426	547	222	0	0	0	2	32	3
Rhode Island	0	0	0	11	39	15	0	0	0	1	0	0
Connecticut	1	0	0	102	124	93	0	0	0	1	0	0
MIDDLE ATLANTIC												
New York	0	3	0	577	595	538	0	0	0	3	4	8
New Jersey	0	0	0	359	173	236	0	0	0	3	0	0
Pennsylvania[3]	0	2	1	844	282	393	0	0	0	1	3	7
EAST NORTH CENTRAL												
Ohio	0	0	0	588	317	317	0	13	0	1	1	3
Indiana	0	1	0	131	127	127	2	3	3	2	2	1
Illinois	1	3	0	495	239	313	0	2	2	1	0	2
Michigan[3]	0	0	0	404	133	250	1	0	0	2	1	2
Wisconsin	1	0	0	394	366	171	0	1	1	1	0	0
WEST NORTH CENTRAL												
Minnesota	0	0	0	172	48	72	0	0	3	0	0	1
Iowa	0	0	0	117	44	50	0	1	6	1	0	1
Missouri	0	0	0	170	48	73	0	0	3	3	5	1
North Dakota	0	0	0	49	3	9	0	0	0	0	0	0
South Dakota	0	0	0	16	8	15	2	0	0	0	0	0
Nebraska	1	0	0	125	32	19	0	2	0	0	0	0
Kansas	1	1	0	122	53	68	0	1	0	1	0	0
SOUTH ATLANTIC												
Delaware	0	0	0	18	6	11	0	0	0	0	0	0
Maryland[3]	0	0	0	222	164	48	0	0	0	2	3	2
District of Columbia	0	0	0	145	20	18	0	0	0	0	0	0
Virginia	1	0	0	64	57	31	0	0	0	5	2	2
West Virginia	0	0	0	93	26	39	0	0	0	1	3	2
North Carolina	0	0	0	37	25	25	0	0	0	2	2	2
South Carolina	0	0	0	2	9	2	0	0	0	1	1	2
Georgia	0	0	0	43	12	12	0	0	0	8	2	2
Florida	0	0	0	9	10	6	0	0	0	2	2	1
EAST SOUTH CENTRAL												
Kentucky	0	2	0	83	49	54	1	0	0	0	1	2
Tennessee	1	0	0	96	27	53	0	0	0	3	1	1
Alabama	0	1	2	19	2	12	0	1	1	3	1	1
Mississippi[3]	1	0	0	2	7	7	0	2	0	1	3	3
WEST SOUTH CENTRAL												
Arkansas	0	0	0	11	24	6	0	0	2	3	1	1
Louisiana	4	0	0	12	9	5	1	0	0	3	1	7
Oklahoma	0	0	0	22	15	12	0	0	1	2	0	0
Texas	2	5	2	225	62	37	1	4	4	4	8	6
MOUNTAIN												
Montana	0	0	0	39	5	18	0	0	0	0	0	0
Idaho	0	0	0	54	42	7	0	0	0	0	1	1
Wyoming	0	0	0	13	29	8	0	0	0	0	0	0
Colorado	0	0	0	44	84	34	0	4	0	2	13	0
New Mexico	0	0	0	18	7	7	0	0	0	0	0	0
Arizona	0	1	0	27	4	6	0	0	0	0	0	1
Utah	0	1	0	79	19	13	0	0	0	0	0	0
Nevada	0	0	0	3	0	0	0	0	0	0	0	0
PACIFIC												
Washington	0	1	0	334	44	35	1	0	0	0	1	0
Oregon	0	0	0	153	16	13	0	1	1	0	2	1
California	3	7	3	367	116	133	0	0	0	9	1	8
Total	18	28	17	7,439	4,104	4,104	9	35	46	77	97	91
17 weeks	375	429	401	105,596	67,902	67,902	198	459	752	1,223	979	1,305

See footnotes at end of table.

Telegraphic morbidity reports from State health officers for the week ended April 29, 1944, and comparison with corresponding week of 1943 and 5-year median—Con.

Division and State	Whooping cough			Week ended April 29, 1944								
	Week ended—		Median 1939–43	Anthrax	Dysentery			Encephalitis, infectious	Leprosy	Rocky Mt. spotted fever	Tularemia	Typhus fever
	April 29, 1944	May 1, 1943			Amebic	Bacillary	Unspecified					
NEW ENGLAND												
Maine	18	48	19	0	0	0	0	0	0	0	0	0
New Hampshire	3	2	2	0	0	0	0	0	0	0	0	0
Vermont	13	23	23	0	0	0	0	0	0	0	0	0
Massachusetts	96	140	215	0	0	0	0	0	0	0	0	0
Rhode Island	8	28	28	0	0	0	0	0	0	0	0	0
Connecticut	11	50	70	0	0	0	0	1	0	0	0	0
MIDDLE ATLANTIC												
New York	100	190	348	0	0	3	0	1	0	0	0	0
New Jersey	58	187	187	0	0	0	0	0	0	0	0	0
Pennsylvania [2]	103	243	246	0	0	0	0	0	0	0	0	0
EAST NORTH CENTRAL												
Ohio	59	190	229	0	1	0	0	2	0	0	0	0
Indiana	5	95	60	0	0	0	10	0	0	0	0	0
Illinois	21	126	126	0	2	0	0	1	0	0	0	0
Michigan [3]	65	227	196	0	0	1	0	0	0	0	0	0
Wisconsin	50	209	170	0	1	0	0	1	0	0	0	0
WEST NORTH CENTRAL												
Minnesota	23	104	44	0	3	0	0	0	0	0	0	0
Iowa	20	51	29	0	0	0	0	0	0	0	0	0
Missouri	8	24	16	0	0	0	1	1	0	0	0	0
North Dakota	2	1	5	0	0	0	0	0	0	0	0	0
South Dakota	2	8	4	0	0	0	0	0	0	0	0	0
Nebraska	18	22	16	0	0	0	0	[illegible]	0	0	0	0
Kansas	40	77	43	0	0	0	0	1	0	0	0	0
SOUTH ATLANTIC												
Delaware	0	1	5	0	0	0	0	0	0	0	0	0
Maryland [3]	22	123	112	0	0	0	4	0	0	0	0	0
District of Columbia	5	33	27	0	0	0	0	0	0	0	0	0
Virginia	62	104	79	0	0	0	45	0	0	0	0	1
West Virginia	6	48	35	0	0	0	0	0	0	0	0	0
North Carolina	159	185	185	0	0	0	0	0	0	0	0	0
South Carolina	73	58	81	0	0	10	0	0	0	0	0	1
Georgia	12	50	28	0	2	4	0	0	0	0	1	10
Florida	16	44	32	0	0	0	0	1	0	0	0	1
EAST SOUTH CENTRAL												
Kentucky	43	22	84	0	0	0	0	0	0	0	0	0
Tennessee	26	69	42	0	1	0	0	0	0	0	0	0
Alabama	10	66	39	0	3	0	0	4	0	0	0	5
Mississippi [3]	-----	-----	-----	0	0	0	0	0	0	0	3	1
WEST SOUTH CENTRAL												
Arkansas	41	39	33	0	0	11	0	0	0	0	1	0
Louisiana	0	6	12	0	0	11	0	0	0	0	1	4
Oklahoma	1	36	36	0	0	0	0	0	0	0	0	0
Texas	316	602	318	0	7	276	0	6	0	0	3	23
MOUNTAIN												
Montana	4	5	5	0	0	0	0	0	0	1	0	0
Idaho	2	1	4	0	0	0	0	0	0	0	0	0
Wyoming	5	0	1	0	0	0	0	0	0	3	0	0
Colorado	25	35	35	0	0	0	0	0	0	0	0	0
New Mexico	17	39	39	0	0	0	0	0	0	0	0	0
Arizona	15	19	24	0	0	0	47	0	0	0	0	0
Utah	47	72	57	0	0	0	0	0	0	0	0	0
Nevada	2	0	0	0	0	0	0	0	0	0	0	0
PACIFIC												
Washington	33	45	56	0	0	0	0	0	0	0	0	0
Oregon	30	14	20	0	0	0	0	0	0	1	0	0
California	98	320	375	0	1	7	0	2	0	0	0	0
Total	1,793	4,081	3,889	0	21	323	107	21	0	5	9	46
17 weeks	30,707	68,264	68,264	17	449	3,668	1,130	189	9	12	172	650
17 weeks, 1943	-----	-----	-----	25	10	3,288	782	189	8	26	284	789

[1] New York City only. [2] Psittacosis: 1 case in Pennsylvania. [3] Period ended earlier than Saturday.
[4] Including paratyphoid fever cases reported separately as follows: Rhode Island 1, New York 1, Texas 1, Colorado 1. West Virginia reports of typhoid fever through March and April include 5 cases of paratyphoid fever.

WEEKLY REPORTS FROM CITIES

City reports for week ended April 15, 1944

This table lists the reports from 87 cities of more than 10,000 population distributed throughout the United States, and represents a cross section of the current urban incidence of the diseases included in the table.

	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
NEW ENGLAND												
Maine:												
Portland	0	1	------	0	27	2	1	0	14	0	0	0
New Hampshire:												
Concord	0	0	------	0	0	0	0	0	2	0	0	0
Vermont:												
Barre	0	0	------	0	0	0	0	0	1	0	0	0
Massachusetts:												
Boston	4	0	------	0	209	5	25	0	108	0	0	14
Fall River	0	0	------	0	24	0	0	0	2	0	0	2
Springfield	0	0	------	0	23	1	0	0	22	0	0	6
Worcester	0	0	------	0	0	0	8	0	51	0	0	2
Rhode Island:												
Providence	0	0	2	0	174	1	5	0	10	0	0	1
Connecticut:												
Bridgeport	0	0	------	0	22	1	1	0	4	0	0	0
Hartford	0	0	------	0	10	0	3	0	26	0	0	3
New Haven	0	0	------	0	154	0	1	0	1	0	0	7
MIDDLE ATLANTIC												
New York:												
Buffalo	0	0	------	1	3	2	10	0	11	0	0	0
New York	6	0	2	2	1,408	27	75	2	286	0	2	25
Rochester	0	0	------	0	6	3	1	0	4	0	0	0
Syracuse	0	0	------	0	15	0	2	0	13	0	1	18
New Jersey:												
Camden	1	0	------	0	0	0	2	0	40	0	0	0
Newark	0	0	------	2	300	4	5	0	17	0	0	7
Trenton	0	0	------	0	1	0	3	0	10	0	0	0
Pennsylvania:												
Philadelphia	3	1	2	------	54	13	42	0	114	0	0	4
Pittsburgh	0	0	1	1	40	6	28	0	35	0	0	6
Reading	0	0	------	0	2	0	5	0	3	0	0	1
EAST NORTH CENTRAL												
Ohio:												
Cincinnati	2	0	------	2	44	4	1	0	64	0	0	8
Cleveland	0	0	2	0	147	10	15	0	90	0	1	8
Columbus	0	0	2	2	96	2	2	0	11	0	0	10
Indiana:												
Fort Wayne	0	0	------	0	0	0	0	0	2	0	0	0
Indianapolis	0	0	------	2	69	3	5	0	47	0	1	3
South Bend	0	0	------	0	3	0	0	0	4	0	0	0
Terre Haute	0	0	------	0	2	1	1	0	1	0	0	0
Illinois:												
Chicago	2	0	3	4	130	25	34	0	203	0	1	22
Springfield	0	0	------	0	41	0	3	0	3	0	0	1
Michigan:												
Detroit	4	0	------	0	123	12	21	0	137	0	0	15
Flint	0	0	------	0	8	1	2	0	6	0	0	0
Grand Rapids	0	0	------	0	45	0	2	0	12	0	0	0
Wisconsin:												
Kenosha	0	0	------	0	115	0	0	0	0	0	0	0
Milwaukee	1	0	------	0	166	3	3	0	59	0	0	15
Racine	0	0	------	0	25	0	0	0	4	0	0	1
Superior	0	0	------	0	3	0	0	0	34	0	0	0
WEST NORTH CENTRAL												
Minnesota:												
Duluth	0	0	------	0	69	0	1	0	24	0	0	3
Minneapolis	0	0	------	2	328	4	7	1	39	0	0	3
St. Paul	0	0	------	1	420	2	6	0	29	0	0	0
Missouri:												
Kansas City	0	0	------	0	117	3	6	0	38	0	0	0
St. Joseph	0	0	------	0	1	0	0	0	7	0	0	0
St. Louis	0	0	1	0	112	9	7	0	45	0	0	9
Nebraska:												
Omaha	2	0	------	0	63	0	6	0	31	0	0	0
Kansas:												
Topeka	0	0	------	0	49	0	0	0	6	0	0	3
Wichita	0	0	------	0	48	0	3	0	8	0	0	2

City reports for week ended April 15, 1944—Continued

	Diphtheria cases	Encephalitis, infectious, cases	Influenza: Cases	Influenza: Deaths	Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
SOUTH ATLANTIC												
Delaware:												
Wilmington	1	0		0	2	0	1	0	1	0	0	0
Maryland:												
Baltimore	5	0	3	3	650	6	16	0	92	0	0	21
Cumberland	0	0		0	0	0	0	0	0	0	0	0
Frederick	0	0		0	3	0	0	0	5	0	0	0
District of Columbia:												
Washington	0	0		0	195	2	6	0	135	0	0	3
Virginia:												
Lynchburg	0	0		0	3	0	2	0	0	0	0	0
Richmond	0	0		0	105	1	2	0	6	0	0	1
Roanoke	0	0		0	25	0	0	0	2	0	0	4
West Virginia:												
Charleston	0	0		0	2	0	0	0	9	0	0	0
Wheeling	0	0		0	0	0	4	0	0	0	0	0
North Carolina:												
Winston-Salem	0	0		0	21	0	1	0	0	0	0	1
South Carolina:												
Charleston	0	0	4	0	29	1	0	0	0	0	0	0
Georgia:												
Atlanta	0	0	25	1	18	1	2	0	6	0	1	1
Brunswick	0	0		0	4	1	4	0	0	0	0	0
Savannah	0	0	1	1	11	0	1	0	0	0	0	0
Florida:												
Tampa	0	0		0	6	1	0	0	0	0	0	0
EAST SOUTH CENTRAL												
Tennessee:												
Memphis	0	0	2	0	51	8	6	0	45	0	0	9
Nashville	1	0		1	12	1	5	0	9	0	0	1
Alabama:												
Birmingham	1	0	5	0	27	0	5	0	5	0	0	0
Mobile	0	0		1	4	4	2	0	0	0	0	0
WEST SOUTH CENTRAL												
Arkansas:												
Little Rock	0	0		1	49	0	0	0	1	0	0	0
Louisiana:												
New Orleans	0	0	3	0	30	6	2	0	7	0	1	0
Shreveport	0	0		0	0	0	4	0	1	0	1	0
Texas:												
Dallas	2	0		0	198	3	3	0	5	0	0	0
Galveston	1	0		0	250	0	3	0	2	0	0	0
Houston	1	0		0	27	0	8	0	2	0	0	0
San Antonio	1	0	1	1	18	1	10	0	3	0	0	0
MOUNTAIN												
Montana:												
Billings	0	0		0	9	0	0	0	2	0	0	0
Great Falls	2	0		0	23	1	2	0	6	0	0	0
Helena	0	0		0	0	0	0	0	0	0	0	0
Missoula	0	0		0	7	0	0	0	3	0	0	0
Idaho:												
Boise	0	0		0	3	0	0	0	2	0	0	0
Colorado:												
Denver	1	0	6	1	120	1	2	0	21	0	0	14
Pueblo	0	0		0	13	0	1	0	3	0	0	3
Utah:												
Salt Lake City	0	0		0	4	0	1	0	21	0	0	1
PACIFIC												
Washington:												
Seattle	0	0		0	43	0	10	0	64	0	0	8
Spokane	0	0		0	36	0	2	0	0	0	0	0
Tacoma	0	0		0	8	0	0	0	45	0	0	0
California:												
Los Angeles	7	0	7	1	364	6	3	1	23	0	0	8
Sacramento	0	0		0	0	0	1	0	2	0	0	6
San Francisco	1	0	3	0	102	2	5	1	30	0	0	6
Total	49	2	75	30	7,168	190	456	5	2,236	0	9	280
Corresponding week, 1943	49	3	126	46	8,496	207	527	3	1,742	1	12	1,168
Average, 1939-43	73		222	[1] 36	[2] 5,995		[1] 445		1,540	5	16	1,121

[1] 3-year average, 1941-43.
[2] 5-year median.

Dysentery, amebic.—Cases: Philadelphia, 2; Chicago, 1.
Dysentery, bacillary.—Cases: Providence, 1; New York, 5; Chicago, 1; Charleston, S. C., 4; Los Angeles, 3.
Dysentery, unspecified.—Cases: San Antonio, 2.
Typhus fever.—Cases: Houston, 1; San Antonio, 1.

Rates (annual basis) per 100,000 population, by geographic groups, for the 87 cities in the preceding table (estimated population, 1942, 34,648,700)

	Diphtheria case rates	Encephalitis, infectious, case rates	Influenza		Measles case rates	Meningitis, meningococcus, case rates	Pneumonia death rates	Poliomyelitis case rates	Scarlet fever case rates	Smallpox case rates	Typhoid and paratyphoid fever case rates	Whooping cough case rates
			Case rates	Death rates								
New England	10.0	2.5	5.0	0.0	1,602	24.9	109.6	0.0	600	0.0	0 0	87
Middle Atlantic	4.5	0.4	2.2	2.7	818	24.6	77.4	0 9	238	0.0	1.3	27
East North Central	5.3	0.0	4.1	5.9	595	35.7	52.1	0.0	396	0 0	1.8	49
West North Central	4.0	0.0	2.0	5.9	2,394	35.7	71 4	2.0	450	0.0	0.0	40
South Atlantic	10.4	0.0	57 4	8.7	1,869	22.6	67.9	0 0	445	0.0	1.7	54
East South Central	11.9	0.0	41.7	11.9	560	77.4	107 2	0.0	351	0.0	0.0	60
West South Central	14.7	0.0	11.8	5.9	1,682	29.4	88.2	0.0	62	0.0	5.9	0
Mountain	24.2	0.0	48.4	8.1	1,443	16.1	48.4	0.0	468	0.0	0.0	145
Pacific	14.0	0.0	17.5	1.8	969	14.0	36.8	3.5	287	0.0	0.0	49
Total	7.4	0.3	11 3	4.5	1,082	28.7	68.8	0.8	337	0 0	1.4	43

TERRITORIES AND POSSESSIONS

Puerto Rico

Notifiable diseases—4 weeks ended March 25, 1944.—During the 4 weeks ended March 25, 1944, cases of certain notifiable diseases were reported in Puerto Rico as follows:

Disease	Cases	Disease	Cases
Cerebrospinal meningitis	1	Measles	4
Chickenpox	53	Ophthalmia neonatorum	2
Diphtheria	42	Pellagra	1
Dysentery	12	Poliomyelitis	1
Erysipelas	1	Syphilis	900
Filariasis	21	Tetanus	6
German measles	11	Tetanus, infantile	4
Gonorrhea	455	Tuberculosis (all forms)	559
Influenza	239	Typhoid fever	26
Lymphogranuloma inguinale	9	Typhus fever, endemic	9
Malaria	1,333	Whooping cough	94

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—Week ended April 1, 1944.—During the week ended April 1, 1944, cases of certain communicable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox		30		136	402	56	30	78	138	870
Diphtheria		8	5	19		3	1	5	2	43
German measles		5		115	109	10	40	22	45	346
Influenza		23			41	1	2		11	81
Measles		97	1	884	734	268	79	186	41	2,290
Meningitis, meningococcus		1			3	1	1		8	14
Mumps		5	1	185	331	94	15	70	52	753
Poliomyelitis								1		1
Scarlet fever		8	15	107	283	94	35	104	107	753
Tuberculosis (all forms)			3	206	48	8		10	46	321
Typhoid and paratyphoid fever				37	4			10	1	52
Undulant fever				3					2	5
Whooping cough		27		85	56	1	3	49	21	242

NOTE.—No report was received from Prince Edward Island for this period.

GREAT BRITAIN

England and Wales—Infectious diseases—4 weeks ended January 29, 1944.—During the 4 weeks ended January 29, 1944, cases of certain infectious diseases were reported in England and Wales as follows:

Disease	Cases	Disease	Cases
Cerebrospinal fever	286	Pneumonia	5,129
Diphtheria	2,826	Puerperal pyrexia and puerperal sepsis	655
Dysentery	664	Scarlet fever	7,603
Measles	2,744	Typhoid fever	9
Ophthalmia neonatorum	275	Whooping cough	8,150
Paratyphoid fever	14		

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

NOTE.—Except in cases of unusual incidence, only those places are included which had not previously reported any of the above-mentioned diseases, except yellow fever, during the current year. All reports of yellow fever are published currently.

A table showing the accumulated figures for these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.

(Few reports are available from the invaded countries of Europe and other nations in war zones.)

Plague

Bolivia.—Chuquisaca Department—Arrayan.—For the month of March 1944, 4 cases of plague with 3 deaths were reported in Arrayan, Chuquisaca Department, Bolivia.

Egypt.—Plague has been reported in Egypt as follows: Ismailiya (port), April 1–7, 1944, 3 cases, 2 deaths; Ismailiya District—April 1–7, 1944, 8 cases, April 8–14, 1944, 20 cases, 7 deaths, including 8 cases reported in the southern part of the district.

Indochina.—For the period March 11–20, 1944, 1 case of plague was reported in Annam, and 3 cases were reported in Laos, Indochina.

Smallpox

Algeria.—For the period March 11–20, 1944, 34 cases of smallpox were reported in Algeria.

Bolivia.—For the month of March 1944, smallpox was reported in Bolivia by Departments as follows: Pa Paz, 25 cases, 10 deaths; Potosi, 7 cases, 1 death; Oruro, 6 cases.

French Guinea.—For the period March 11–20, 1944, 26 cases of smallpox with 4 deaths were reported in French Guinea.

Indochina.—For the period March 11–20, 1944, 70 cases of smallpox were reported in Indochina.

Ivory Coast.—For the period March 11–20, 1944, 41 cases of smallpox with 3 deaths were reported in Ivory Coast.

Niger Territory.—For the period March 11–20, 1944, 34 cases of smallpox with 4 deaths were reported in Niger Territory.

Sudan (French).—For the period March 11–20, 1944, 57 cases of smallpox with 3 deaths were reported in French Sudan.

Turkey.—For the month of February 1944, 2,456 cases of smallpox were reported in Turkey.

Typhus Fever

Algeria.—For the period March 11–20, 1944, 29 cases of typhus fever were reported in Algeria.

Bolivia.—For the month of March 1944, 16 cases of typhus fever with 5 deaths were reported in Bolivia by Departments as follows: Chuquisaca, 1 death; La Paz, 15 cases, 4 deaths; Oruro, 1 case.

Ecuador.—During the month of March 1944, 48 cases of typhus fever with 4 deaths were reported in Ecuador as follows: Ambato,

Tungurahua Province, 12 cases, 1 death; Azogues, Canar Province, 1 case; Guayaquil, Guayas, 1 case; Libertad, Guayas County, 1 case; Quito, Pichincha Province, 32 cases, 2 deaths; Riobamba, Chimborazo Province, 1 case, 1 death.

France—Paris.—For the period March 12–18, 1944, 2 imported cases of typhus fever were reported in Paris, France.

Guatemala.—An outbreak of typhus fever is reported to have occurred in the Insane Asylum of Guatemala City, Guatemala, during the middle of March 1944. On April 12, 1944, 92 cases were isolated in this institution. All sanitary precautions have been taken, and the outbreak appears to be abating.

Hungary.—For the 2 weeks ended March 25, 1944, 182 cases of typhus fever were reported in Hungary. For the week ended April 1, 1944, 151 cases were reported.

Morocco (Spanish)—Mellila.—For the week ended March 18, 1944, 3 cases of typhus fever were reported in Mellila, Spanish Morocco.

Salvador—San Salvador.—During the month of March 1944, 2 cases of typhus fever were reported in San Salvador, Salvador.

Spain.—For the 2 weeks ended March 18, 1944, 43 cases of typhus fever were reported in Spain.

Turkey.—For the month of February 1944, 334 cases of typhus fever were reported in Turkey.

Venezuela.—For the month of February 1944, typhus fever was reported in Venezuela as follows: Maracay, Araguay State, 1 case; Porlamar, Sucre State, 1 case; San Fernando, Apure State, 1 case; Tinaquillo, Cojedes State, 1 case; Valera, Trujillo State, 1 case.

COURT DECISION ON PUBLIC HEALTH

Liability of city for noxious odors from sewage disposal plant.—(Iowa Supreme Court; *Duncanson* v. *City of Fort Dodge*, 11 N.W.2d 583; decided November 16, 1943.) A home owner brought an action for damages against the city of Fort Dodge because of alleged serious inconvenience and discomfort caused by nauseating odors from the city's sewage disposal plant. In deciding adversely to one of the defendant's contentions the Supreme Court of Iowa took the view that a verdict for the plaintiff could be based on evidence of inconvenience and discomfort suffered by himself and his family by reason of noxious odors produced by the nuisance even though there was no evidence of any expense connected with any sickness or discomfort.

FEDERAL SECURITY AGENCY

UNITED STATES PUBLIC HEALTH SERVICE

THOMAS PARRAN, *Surgeon General*

DIVISION OF PUBLIC HEALTH METHODS

G. ST. J. PERROTT, *Chief of Division*

The PUBLIC HEALTH REPORTS, first published in 1878 under authority of an act of Congress of April 29 of that year, is issued weekly by the United States Public Health Service through the Division of Public Health Methods, pursuant to the following authority of law: United States Code, title 42, sections 7, 30, 93; title 44, section 220.

It contains (1) current information regarding the prevalence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

The PUBLIC HEALTH REPORTS is published primarily for distribution, in accordance with the law, to health officers, members of boards or departments of health, and other persons directly or indirectly engaged in public health work. Articles of special interest are issued as reprints or as supplements, in which forms they are made available for more economical and general distribution.

Requests for and communications regarding the PUBLIC HEALTH REPORTS, reprints, or supplements should be addressed to the Surgeon General, United States Public Health Service, Washington 25, D. C. Subscribers should remit direct to the Superintendent of Documents, Washington 25, D. C.

Librarians and others should preserve their copies for binding, as the Public Health Service is unable to supply the general demand for bound copies. Indexes will be supplied upon request.

UNITED STATES GOVERNMENT PRINTING OFFICE, WASHINGTON : 1944

For sale by the Superintendent of Documents, Washington 25, D. C.

Price 5 cents. Subscription price $2.50 a year

Public Health Reports

VOLUME 59 MAY 12, 1944 NUMBER 19

IN THIS ISSUE

CONTENTS

Public Health Reports

Vol. 59 • MAY 12, 1944 • *No. 19*

ORGANIZATION OF THE MEDICAL AND SANITARY PROGRAM, ALASKA HIGHWAY PROJECT

By EDWIN H. CARNES, *Senior Surgeon, United States Public Health Service*

On April 4, 1942, the Administrator of the Federal Works Agency requested the assistance of the Surgeon General of the United States Public Health Service in the operation of hospitals and clinics on the Alaska Highway project of the Public Roads Administration. The Surgeon General agreed to assume responsibility for medical care of civilians engaged in construction of the Alaska Highway and for the supervision of the various features of sanitation on the project. Under the terms of the agreement, the Surgeon General undertook to furnish the necessary medical, dental, and sanitary officers; the Commissioner of the Public Roads Administration undertook to recruit all additional personnel on recommendation of the Public Health Service officer in charge, to build and equip hospitals, provide ambulances, furnish transportation, and meet such other nonprofessional needs as might arise.

On May 21 a director of the medical and sanitary program,[1] a chief sanitation officer,[2] and an assistant medical officer,[3] were assigned to the project. The director was instructed to report, by June 1, to the district engineer of the Public Roads Administration in charge of the project, in Seattle, Wash.

The task that confronted this small vanguard was to set up facilities that would provide medical care for thousands of men scattered over 1,600 miles of wilderness in over 100 widely separated camps, to supervise sanitation, recruit additional personnel, obtain equipment, and establish sources and means of supply.

PRELIMINARY SURVEY

Before plans could be made for organization, hospital construction, sanitary installations, and procurement of personnel, it was necessary to survey the area and obtain detailed information concerning the plans of the Public Roads Administration in regard to distribution and number of personnel and location of camps. Shortly after arriv-

[1] Senior Surgeon E. H. Carnes.
[2] Passed Assistant Sanitary Engineer R. W. Kehr (deceased).
[3] Passed Assistant Surgeon M. B. Noyes.

ing in Seattle, the director and the chief sanitation officer arranged for airplane transportation from Seattle to Fairbanks, with stops at all airports along the route of the proposed highway.

Obtaining airplane transportation from the States to Alaska via various airports in Canada proved to be a fairly complicated process. Because of the enormous acceleration of travel to Canada and Alaska in connection with the war effort, the various air lines were overtaxed The first step necessary was to secure priority for travel, since priority was granted in accordance with the importance of each traveler's mission. The next step was to obtain a permit from the Alaska Travel Control of the Western Defense Command to enter Alaska. These steps accomplished, the air lines then booked passage as seats were available.

The next obstacle to be overcome was one beyond the control of any official—the weather. A delay of several days in starting, or en route, because of unsuitable weather conditions was a familiar concomitant of air travel. During the course of numerous flights up and down the line the officer in charge was "held" at every airport between Vancouver, British Columbia, and Fairbanks, Alaska, for periods varying from a few hours to several days. Another prospect the air traveler had to consider was the possibility of being "bumped" or "off-loaded" at any port en route by someone holding a higher priority and thus finding himself stranded until the high priority holders had been flown to their destinations.

Equipped with priorities, permits, and a bottle of perchloron, the survey trip was begun. The first leg of the flight was from Vancouver to Fort St. John, British Columbia, site of the Public Roads Administration headquarters for the southern sector of the highway and assembly point of survey parties and contractors. Fort St. John is 48 miles from Dawson Creek, the railhead and beginning of the Alaska Highway. After a survey of medical facilities and sanitary conditions at Fort St. John, the party proceeded to Fairbanks, stopping at Fort Nelson, Watson Lake, and Whitehorse, headquarters for the northern sector. From Fairbanks it was necessary to travel southeast to Gulkana and Slana, Alaska, on the Richardson Highway, which was to be improved to give access from the sea at Valdez to points on the western end of the Alaska Highway. On the advice of the sanitary officer, all water for personal consumption was liberally dosed with perchloron. The taste of chlorine is associated strongly with memories of the survey trip.

PLAN OF ORGANIZATION

Following the survey trip, a tentative plan of organization was drawn up. To provide medical facilities on the highway, a base hospital was recommended for each of the two sectors, one to be located at Fort

Nelson, British Columbia, the other at Whitehorse. To supplement these base hositals, it was proposed to contract for beds in small civilian hospitals already in operation at Dawson Creek, Fort St.

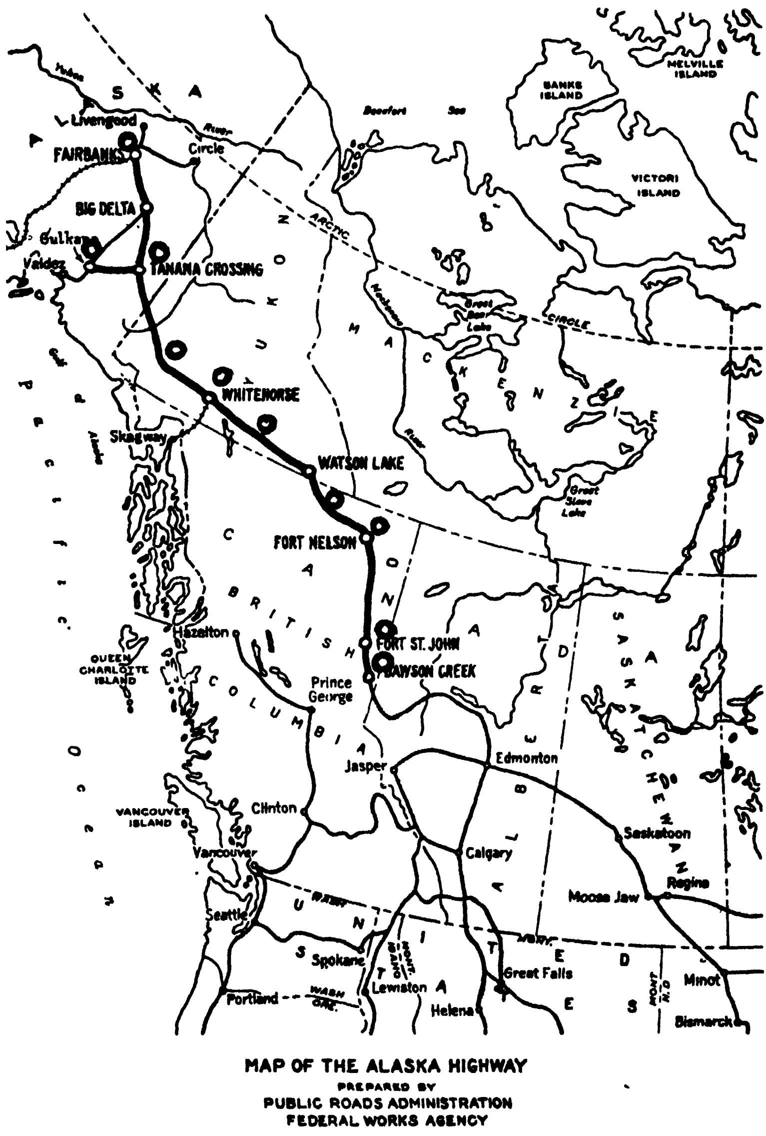


FIGURE 1.—Circles on the Alaska Highway indicate the approximate position of the various medical facilities.

John, Whitehorse, and Fairbanks and to install dispensaries at 200-mile intervals between these points so that no camp would be over 100 miles from medical facilities.

In addition, it was recommended that each camp install a first-aid station, with a competent first-aid attendant on duty at all times and equipped with necessary first-aid supplies. An ambulance was proposed for each camp of over 100 men.

The chief sanitation officer divided the area into three sections and requested the assignment to each section of a sanitary engineer whose duties would consist of inspection of camp sanitation, water-supply and sewerage systems, and the furnishing of technical advice in the design and installation of such systems.

To put this paper organization into actual operation proved an arduous task. At the very beginning it was necessary to send the medical assistant into the field to render medical care. As a result, his assistance in organizational work was not available. Early in the program a second medical officer was active in the field. Thus, from the outset there was a continuous demand by medical personnel for supplies.

In the early throes of organization, no office space was available for the headquarters of the medical and sanitary program; secretarial help was available only on loan, and 2 months passed before an administrative assistant with the essential specialized training was assigned. The director of the program was confronted with the immediate and urgent necessity of obtaining suitable office space, securing secretarial help, supplying the two medical officers already in the field, and drawing plans and designs for hospitals, dispensaries, and first-aid stations.

Having obtained a room for temporary use as an office, which was moved four times in 2 weeks, the medical program fell heir to a heterogeneous collection of WPA medical and surgical supplies. To expedite packing and shipping, the most urgently needed items were moved into the office. Here, surrounded by bottles of aspirin tablets, packages of bandages, bedpans, urinals, and other hospital impedimenta, the officer in charge alternated between packing supplies into trunk lockers for shipment and interviewing prospective medical officers, nurses, hospital attendants, and other personnel. Within a few days, however, enough supplies and equipment were shipped to enable the field medical staff to set up small dispensaries equipped for minor surgery and routine medical care and to inoculate hundreds of employees against typhoid fever.

HOSPITAL CONSTRUCTION

As no plans for hospitals suitable for rapid construction and adaptable for use in the sub-Arctic were available, it was necessary to evolve such plans. The services of W. I. Turner, architect on duty with the United States Forestry Service, were obtained on loan, and a mechanical engineer was engaged on a temporary status.

The medical officer in charge served as consultant in hospital requirements, and work was begun immediately on the plans and continued uninterruptedly until their completion and approval by the district engineer and the Commissioner of the Public Roads Administration.

The plans were based on the use of prefabricated panels manufactured in Seattle, which could be shipped to the field and erected at desired points. The Public Roads Administration had used the same material in the construction of barracks. The comparative simplicity of construction, the speed with which the panels could be manufactured and erected, and the substantial structural characteristics of the completed building indicated the suitability of this type of construction for medical purposes.

The plans for the base hospitals were fairly elaborate, providing a capacity of 50 beds each, with potential expansion to 100 beds or more by the addition of ward sections. The main portion of the building was planned to house the administrative and clinical facilities, with wings added for wards, kitchen, and mess hall.

These hospitals and dispensaries are now operated by the Health Service, United States Army Corps of Engineeers, in connection with collateral projects in that area.

All buildings are of one story; the walls and floors are lined and insulated to withstand outside temperatures from 40° to 60° below zero. Heating, except for the operating suite, is furnished by oil-burning stoves, which are located at strategic points throughout the building.

The chief purpose of the smaller, 15-bed dispensary units was to provide facilities for out-patient service, with sufficient beds to handle routine cases. They were equipped for the performance of minor surgery, although major emergencies such as compound fractures, strangulated hernias, and appendectomies have been handled successfully, as have cases of cerebrospinal meningitis and pneumonia. The normal dispensary staff consisted of one medical officer, three or four registered nurses, and two attendants. Food for the bed patients was brought from the main kitchen and served on individual trays from a small diet kitchen.

The first base hospital, prefabricated in Seattle, was destined for Whitehorse. On its arrival at Whitehorse, however, it was diverted to the Army, as the requirements of the military personnel were far more pressing. With a sub-Arctic winter ahead, there was urgent need to move the Army hospital, then housed in a temporary shelter, into more substantial quarters. In general, the basic hospital plant was erected in accordance with the original plan, although its capacity was increased from 50 to 150 by the addition of wings. The Whitehorse hospital, under Army control, admitted cases beyond the scope of the 15-bed dispensary originally erected by the Public Roads

Administration for use pending construction of the larger hospital.

Construction of the base hospital at Fort Nelson and the dispensary at the Liard River Crossing, 213 miles north of Fort Nelson, was begun in midwinter. As transportation of prefabricated panels to these points, accessible neither by rail nor water, would have been fraught with considerable difficulty, it was decided to use material at hand. At the Liard River Crossing, a portable sawmill was set up to saw the lumber for the dispensary. The hospital at Fort Nelson, situated in the midst of dense woods, was built of logs. These were cut, stripped, and erected on a foundation of wooden piles driven 8 feet into the ground. Such construction called for highly skilled craftsmen, whom we were fortunate enough to obtain. Lumber needed for door and window casings, flooring, and similar uses was sawed on the site; the interior was lined with composition board. This building was completed and equipped, and hospital operations were started, in less than 6 months after construction began.

The beautifully matched and fitted log walls harmonize with the rustic environment; and, in appearance, this building would do credit to Banff, Jasper, or other world-famous lodge resorts. In interior fittings and equipment, it is the equal of any small modern hospital. In this isolated spot, hundreds of miles from any other hospital, the Kehr General Hospital, named in honor of Passed Assistant Sanitary Engineer R. W. Kehr, who lost his life in line of duty, will perform a valuable service to humanity for years to come.

Repeated trips by airplane, under all sorts of weather conditions, were necessary to select sites for erection of the various facilities, determine the need for additional installations, equip, staff, and activate them, and to make periodic inspections. It was on one of these trips that Mr. Kehr lost his life; the airplane in which he was flying crashed, with the loss of all on board. This tragedy was a shock and bitter loss to all his associates. The Alaska Highway project and the Public Health Service lost one of their finest and most valuable officers.

MEDICAL FACILITIES

With the exception of the base hospital at Whitehorse, which was diverted to military use, all the facilities originally planned and recommended have been completed and are in active operation. Beginning at Dawson Creek and proceeding north along the highway, dispensaries and hospitals are located as indicated in the following list:

Dawson Creek	Dispensary—beds available under contract with St. Joseph's Hospital.
Fort St. John, British Columbia	Dispensary—beds available under contract with Providence Hospital.
Fort Nelson, British Columbia	Kehr General Hospital—50 beds.
Mile 107 north of Fort Nelson	Dispensary—10 beds.

FIGURE 2.—Nurses' home at Fort Nelson, British Columbia, in pioneering days of project (Photo by U. S Public Roads Administration)

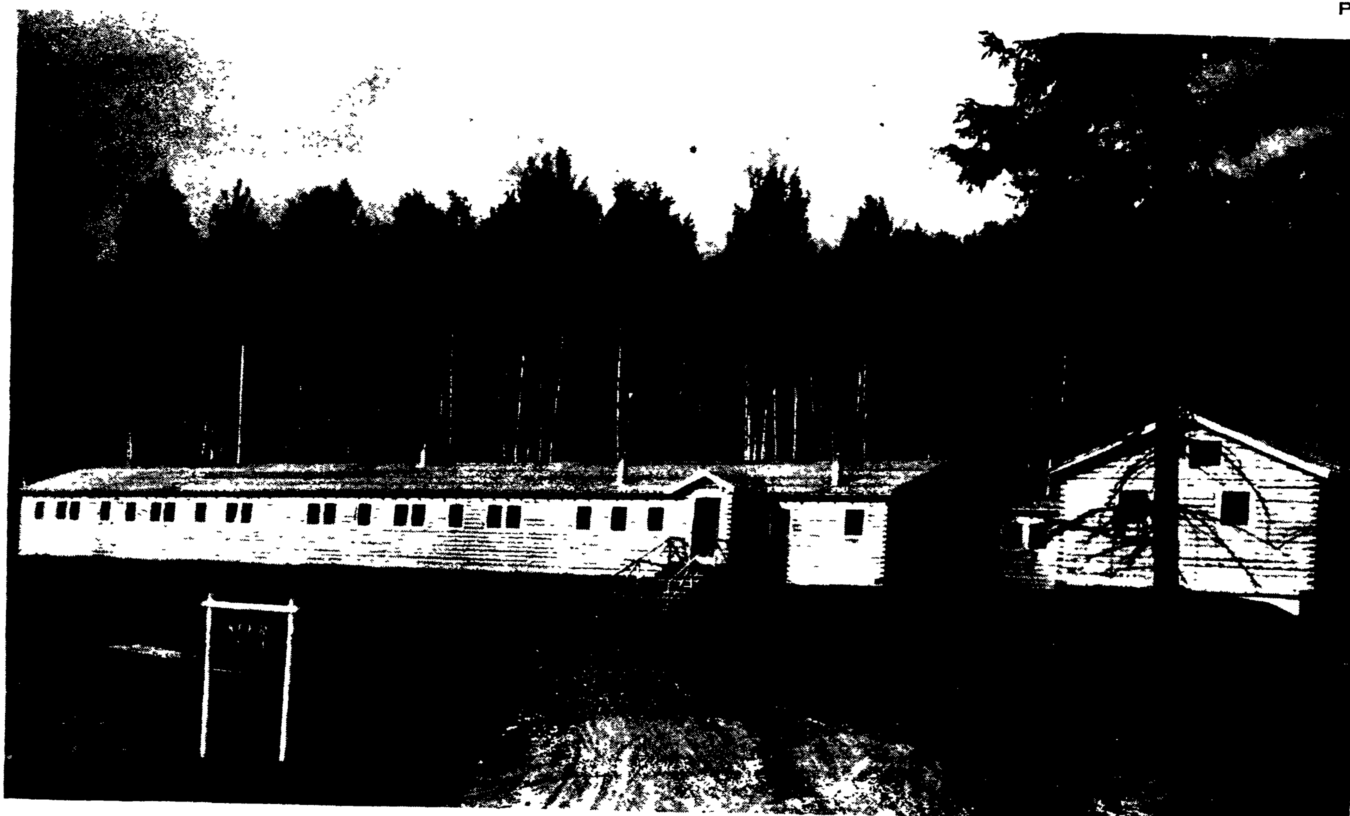


FIGURE 3.—Kehr General Hospital, Fort Nelson, British Columbia. (Photo by U S Public Roads Administration)

Liard River Crossing (213 miles north of Fort Nelson).	Dispensary—20 beds.
Mile 195 east of Whitehorse	Dispensary—12 beds.
Whitehorse, Yukon Territory	Dispensary—30 beds (access to U. S. Army hospital).
Mile 152 west of Whitehorse	Dispensary—12 beds.
Tanacross, Alaska	Dispensary—20 beds.
Gulkana, Alaska	Dispensary—20 beds.
Fairbanks, Alaska	Beds available under contract with St. Joseph's Hospital.

Headquarters of the director of the program and the chief sanitation officer were situated at Whitehorse, selected because of its central location. The director also maintained an office at Edmonton, Alberta, for liaison with the district office of the Public Roads Administration and the officer in charge of the Health Service, United States Army Corps of Engineers. This office also recruited personnel, arranged for hospitalization of cases referred from the various stations on the project, and maintained close contact with the insurance companies covering the project, the Compensation Boards of British Columbia and Alberta, and the United States Employees' Compensation Commission.

An office, under the supervision of an administrative assistant, was maintained at Seattle, Wash., for the procurement and shipment of supplies to the various stations. Supplies were shipped by water to Valdez, Alaska, for transport by truck to the Alaska stations; by water to Skagway, Alaska, for transshipment by rail over the White Pass and Yukon railroad to Whitehorse, and thence by truck to other points in the Yukon; by rail to Dawson Creek, British Columbia, for transshipment by truck to stations along the southern sector of the highway. Some supplies, urgently needed, were shipped by commercial air line or by cargo planes belonging to the United States Army Air Force Transport Command.

Throughout the period of organization and operation of the Alaska Highway medical and sanitary program, medical officers of the United States Army attached to various military units along the way gave the fullest cooperation and practical help in rendering medical care to civilian workers on the project. In the early stages of the program, before the necessary staff could be assembled and hospitals and dispensaries constructed and placed in operation, the services of these officers, freely offered at all times, were indispensable.

MEDICAL RELIEF AND STATISTICS

The professional staff consisted of 13 medical officers, 3 dental officers, 4 sanitary engineers, 23 nurses, and 2 administrative assistants.

During the fiscal year ended June 20, 1943, the following medical relief was furnished:

Out-patient treatments	46, 907
Physical examinations	1, 891
Hospital days	9, 591
Operations performed (major and minor)	693

For the most part, the types of cases treated were those normally encountered in the United States. The majority were general medical cases of a routine nature; next in volume were surgical cases, which included elective surgical operations as well as emergencies. The injuries, in traumatic cases, were either of moderate severity or so extensive as to cause immediate death. Mortality from injuries, however, was quite low, being only 0.037 per 1,000.

The venereal disease rate was unusually low, less than 1 percent of the total cases treated being venereal. This was due, it is believed, to the lack of opportunity to contract the diseases, rather than to any active campaign against venereal diseases.

During the summer months, insect bites constituted a minor, but annoying, problem. No insect-borne diseases were encountered. Men working in the "bush" wore headnets and gloves for protection against mosquitoes. The bite of a gnat (*Phlebotomus*, species undetermined) was more harassing, perhaps, than that of the mosquitoes. The bite of this insect frequently produced infected lesions which were comparatively slow in healing. Occasionally they were accompanied by transitory systemic reactions.

Morbidity and mortality statistics for the 4 months' period ended June 30, 1943, were as follows:

Morbidity rate due to illness	157.78 per 1,000
Morbidity rate due to injury	31.92 per 1,000
Mortality rate due to illness	0.179 per 1,000
Mortality rate due to injury	0.037 per 1,000

While exact figures are not available, the estimated total cost of construction of the dispensaries and the Kehr General Hospital is in the neighborhood of $150,000.

SANITATION

A sanitary engineer was stationed in each of the two sectors of the highway. These officers made periodic inspections of all camps, reporting any deviation from standards of sanitation set up by the Sanitary Engineering Section, and they made definite recommendations for the correction of defects found. In the initial stages of camp construction, they gave technical advice with reference to water supply and sewage disposal and, when necessary, furnished plans and designs for water-supply and sewerage systems.

A highly successful water-sampling program was established by

the Sanitation Section. A scheduled weekly collection program was inaugurated, samples being collected from the various camps on the highway and shipped by Air Transport Command planes to the water-analysis laboratory at Whitehorse. When the water was found to be contaminated, steps were immediately taken to insure the potability of the water supply from which these samples were taken and were followed up later by laboratory checks. During the month of August 1943 alone, 236 water samples were examined at the laboratory. Wallace and Tiernan purification units, Army type, were of considerable assistance in handling the water-purification problem. These units combined pumping, filtration, and purification operations in one piece of equipment. However, because of late delivery, the usefulness of these units was limited. Chlorination of all water was required, and periodic checks were made to determine whether the chlorination was adequate. The facilities of this laboratory were available to other Government agencies.

COORDINATION WITH HEALTH SERVICE, ARMY CORPS OF ENGINEERS

To coordinate the two services, both of which rendered medical care to civilian workers, all commissioned officers of the Public Health Service, by request of the Secretary of War, were assigned to the Health Service of the United States Army Corps of Engineers on March 23, 1943. The medical and sanitary officers of the Public Health Service were concerned primarily with the care of those civilians engaged in highway construction under the Public Roads Administration; the officers of the Army Corps Health Service, with the care of those civilians engaged in the construction of various projects such as pipe-line and refinery construction, telephone lines, and various other developmental activities under the United States Army Corps of Engineers. This arrangement was mutually beneficial and prevented duplication of services and construction.

ACKNOWLEDGMENTS

The director of the medical and sanitary program was fortunate in having a hard-working, conscientious, and cooperative staff. The cooperation of J. S. Bright, district engineer in charge of the project, C. F. Capes and F. W. Andrews, construction engineers at Fort St. John and Whitehorse, respectively, was wholehearted and of great benefit. Mr. Pinkstaff, official staff photographer of the Public Roads Administration, furnished the excellent photographs accompanying this article. The invaluable assistance of the staff of the medical and sanitary program and of the many members of the Public Roads Administration who cooperated so willingly is gratefully acknowledged.

PATHOLOGIC CHANGES IN SHEEP RESULTING FROM EXPOSURE TO LOW BAROMETRIC PRESSURES [1]

By JOHN W. MILLER, *Surgeon (R), United States Public Health Service*

The purpose of this paper is to present the pathologic picture of lethal exposure of sheep to low pressures.

Twelve sheep were subjected at normal temperature to reduced pressures equivalent to 31,000, 36,000, 40,000, and 46,000 feet altitude in an atmosphere of oxygen. The number of exposures ranged from 1 to 16. The intervals between the fatal exposure and the one immediately preceding were 1 to 14 days. The planned duration of exposure at the maximum altitude was 2 hours. All but one of the animals died during the exposure after one or more tests. The sheep sacrificed had survived thirteen 2-hour exposures at simulated altitudes of 36,000 and 40,000 feet. All animals were autopsied immediately after death.

Four conspicuous pathologic findings were observed in these animals: (1) air emboli, (2) epicardial and endocardial hemorrhages, (3) effusion in the serous cavities, and (4) contraction of the spleen. All of these manifestations were usually found in the same animal and the first three showed an appreciable relationship to each other.

Air emboli.—Air emboli were usually found in the vessels of the brain and heart but were also occasionally noted in the vessels of the diaphragm, the jugular, superior mesenteric, and portal veins, the subcutaneous tissue, and in the perirenal fat. The incidence of bubbles varied markedly in the individual sheep. Bubbles were present in the vessels of the brain alone in one sheep, in the brain and heart in two, in the brain and other tissues in three, in brain, heart, and other tissues in four, and in the heart and other tissues in one. Air embolism was greatest in the brain, somewhat less in the heart, and still less in the other tissues. In the brain the air bubbles were present both in the vessels and under the pia, along the sulci. They were generally over the cerebral cortex but were occasionally found in the vessels of the base. In the heart they were found only in the vessels, most frequently in the left branch, and in two instances in the right branch of coronary artery and vein. No gross emboli were found in the joints, bone marrow, testes, or adrenals.

Cardiac hemorrhages.—Petechial hemorrhages were found either in the endocardium, epicardium, or in both in eight of the animals dying as a result of the exposure. In the eleven sheep which died, these hemorrhagic areas occurred in the endocardium in six, in the epicardium in two, and in both in one. The average size of endocar-

[1] From the Industrial Hygiene Research Laboratory, National Institute of Health. This material was taken from experiments on altitude tolerance which were conducted by the Aviation Medicine Unit under the direction of Passed Assistant Surgeon Benjamin F. Jones.

FIGURE 1.—Air bubbles in vessels and under pia mater of brain of sheep exposed to simulated high altitudes.

FIGURE 2 —Air emboli in coronary vessels Small petechiae in epicardium of apex.

FIGURE 3.—Massive area of epicardial hemorrhage with softening of underlying myocardium

dial hemorrhages was greater than those found in the epicardium. In all instances they were present only in the left ventricle. They varied from a few small petechial areas on the wall or papillary muscles to a single area completely covering the entire lining of the left ventricle. In the epicardium they were generally along the left branches of the coronary vessels or near the apex.

In one sheep a massive epicardial hemorrhage covered almost the entire surface of the left ventricle and the underlying muscle was soft and flabby. On gross section it presented the appearance of myocardial rupture. The endocardium of the left ventricle in this animal presented no ecchymoses.

Effusions in serous cavities.—Effusions of clear fluid were observed in the serous cavities in all but two of the sheep exposed to low pressure. It was present in the pleural cavities in six animals. The effusion was generally bilateral, and the amount varied from about 60 to 500 cc. Eight and 60 cc. were present in the pericardial cavity of two sheep. Small but abnormal amounts were found in both pericardial and pleural cavities of one sheep, while about 100 cc. were found in the peritoneal cavity of another. In all cases the fluid coagulated rapidly when the serous cavities were opened.

Contracted spleen.—The spleen was small and contracted in all of the sheep that died as a result of the exposure. It was also moderately contracted in the animal sacrificed following 2 hours of exposure at 40,000 feet altitude. In the two sheep exposed to oxygen alone the spleens were large, soft, and friable.

The condition found in the one animal sacrificed following the thirteenth exposure, while not as extensive as in some of the others, was similar. A moderate number of air bubbles were present in the left coronary artery and in the vessels of the cerebral cortex, while a few occurred under the pia along the sulci. About 75 cc. of clear straw-colored fluid which coagulated fairly rapidly was noted in each pleural cavity. The spleen was moderately contracted, but not as much as in the animals which died as result of low pressure. No epicardial or endocardial hemorrhages were present. In this animal it appears that the changes found did not exceed the limits of toleration to the reduced pressure.

There appeared to be a certain reciprocal relationship between the different pathologic manifestations. Air emboli were much less marked in average degree when the amount of serous effusion was increased. Cardiac hemorrhages were, however, slightly more marked in average degree when effusions were prominent, but no difference was noted in the relation between the presence of air emboli and cardiac hemorrhages. It is quite possible that these hemorrhages may be due to increased cardiac effort.

SUMMARY

Four pathologic conditions—air emboli, epicardial and endocardial hemorrhage, serous effusion, and contracted spleen—were consistently present in 12 sheep exposed to simulated altitudes from 31,000 to 46,000 feet.

SICKNESS ABSENTEEISM AMONG INDUSTRIAL WORKERS, FINAL QUARTER OF 1943, WITH A NOTE ON THE OCCURRENCE OF THE RESPIRATORY DISEASES, 1934–43 [1]

By W. M. Gafafer, *Principal Statistician, United States Public Health Service*

The accompanying data on absences of 8 days or longer accounted for by sickness and nonindustrial injuries are derived from analyses of periodic reports from sick benefit associations, company relief departments, and group insurance plans. The population covered represents over 260,000 male workers.

Final quarter of 1943.—Interest in table 1 centers around the respiratory group of diseases which shows an increase in frequency of 59 percent when the fourth quarter of 1943 is compared with the corresponding quarter of 1942. This change reflects principally the spectacular increase of 130 percent in influenza and grippe, and the increase of 30 percent in bronchitis. It will be observed that the frequency of pneumonia continues on the high level set by the fourth quarter of 1942.

The group of digestive diseases presents an increase of 14 percent. Among this group of diseases the increase of 34 percent for diseases of the stomach except cancer is noteworthy.

Fourth quarters, 1934-43.—The fourth quarter rates for the broad cause groups, and for influenza and grippe, are presented graphically for the 10 years 1934–43 in figure 1. It will be observed that for any selected cause group the rate for 1943 has never been equalled or exceeded during the 10-year period. Of particular interest is the upward movement of the respiratory group beginning in 1939, a movement which is at first slow and later relatively rapid. The rapid increase of the respiratory diseases definitely reflects the behavior of influenza and grippe. Attention is directed to the gradually increasing rates for the nonrespiratory-nondigestive diseases, and the relatively high level for 1941–43 determined by the rates for the digestive diseases. It is notable that the rate for influenza and grippe became sufficiently large in 1942 to exceed again the rate for the digestive diseases and that the further increase in 1943 was sufficiently large to exceed for the first time in the 10 years the rate for the nonrespiratory-nondigestive diseases.

---

[1] From the Industrial Hygiene Division, Bureau of State Services. The report for the third quarter appeared in Public Health Reports, 59: [illegible] (Mar. 17, 1944).

TABLE 1.—*Average annual number of absences on account of sickness and nonindustrial injuries disabling for 8 consecutive calendar days or longer among* MALE *employees in various industries, by cause, the fourth quarter of 1943 compared with the fourth quarter of 1942, and the year 1943 compared with the years 1938–42, inclusive*

Cause. (Numbers in parentheses are disease title numbers from the International List of Causes of Death, 1939)	Annual number of absences per 1,000 males				
	Fourth quarter		Year		
	1943	1942	1943	1942	1938–42
Sickness and nonindustrial injuries [1]	147.7	111.9	136.7	106.3	96.8
Nonindustrial injuries (169–195)	10.9	11.8	11.9	11.7	11.4
Sickness	136.8	100.1	124.8	94.6	85.4
Respiratory diseases	79.0	49.7	65.8	41.8	37.3
Tuberculosis of the respiratory system (13)	.8	.8	.8	.8	.8
Influenza, grippe (33)	44.4	19.3	28.5	15.7	16.0
Bronchitis, acute and chronic (106)	10.8	8.3	10.6	6.8	5.5
Pneumonia, all forms (107–109)	7.3	7.1	8.9	5.6	3.8
Diseases of the pharynx and tonsils (115b, 115c)	4.6	5.0	6.6	5.2	5.0
Other respiratory diseases (104, 105, 110–114)	11.1	9.2	10.4	7.7	6.2
Digestive diseases	16.7	14.7	16.8	16.1	14.7
Diseases of the stomach except cancer (117, 118)	6.3	4.7	5.8	4.7	4.1
Diarrhea and enteritis (120)	2.0	1.6	2.0	1.8	1.4
Appendicitis (121)	4.2	4.0	4.4	4.9	4.8
Hernia (122a)	1.6	1.7	1.9	1.8	1.6
Other digestive diseases (115a, 115d, 116, 122b–129)	2.6	2.7	2.7	2.9	2.8
Nonrespiratory-nondigestive diseases	35.2	33.3	37.5	34.5	31.1
Infectious and parasitic diseases (1–12, 14–24, 26–29, 31, 32, 34–44) [2]	1.6	1.7	2.5	2.5	2.2
Rheumatism, acute and chronic (58, 59)	3.5	3.7	4.4	3.9	3.8
Neurasthenia and the like (part of 84d)	1.5	1.1	1.5	1.1	1.0
Neuralgia, neuritis, sciatica (87b)	2.8	2.4	2.8	2.2	2.2
Other diseases of the nervous system (80–85, 87, except part of 84d, and 87b)	1.6	1.2	1.6	1.2	1.2
Diseases of the heart and arteries, and nephritis (90–99, 102, 130–132)	5.5	5.0	5.4	4.5	4.3
Other diseases of the genitourinary system (133–138)	2.7	2.7	2.7	2.6	2.5
Diseases of the skin (151–153)	3.2	2.8	3.2	2.9	2.8
Diseases of the organs of movement except diseases of the joints (156b)	3.3	3.1	3.5	3.0	2.9
All other diseases (45–57, 60–79, 88, 89, 100, 101, 103, 154, 155, 156a, 157, 162)	9.5	9.6	9.9	10.6	8.2
Ill-defined and unknown causes (200)	5.9	2.4	4.7	2.2	2.3
Average number of males covered in the record	265,986	266,969	269,683	261,432	1,042,219
Number of organizations	18	21	21	21	---------

[1] Industrial injuries, venereal diseases, and a few numerically unimportant causes of disability are not reported.
[2] Except influenza and grippe, respiratory tuberculosis, and the venereal diseases.

The movement of the fourth quarter rates of three other causes of absenteeism of more than passing interest is shown graphically in figure 2. During the past 3 or 4 years the quarterly rates for bronchitis and diseases of the stomach except cancer moved upward, the former more rapidly than the latter. The quarterly rates for pneumonia, on the other hand, describe a more or less level trend to 1941 when the rate abruptly changes from 2.9 to 7.1 in 1942 and 7.3 in 1943.

When the fourth quarter rates for 1943 are related to the corresponding mean rates for the 10 years, three causes or cause groups emerge with ratios that are greater than 2, namely, influenza and grippe (2.76), respiratory diseases (2.14), and pneumonia (2.03).

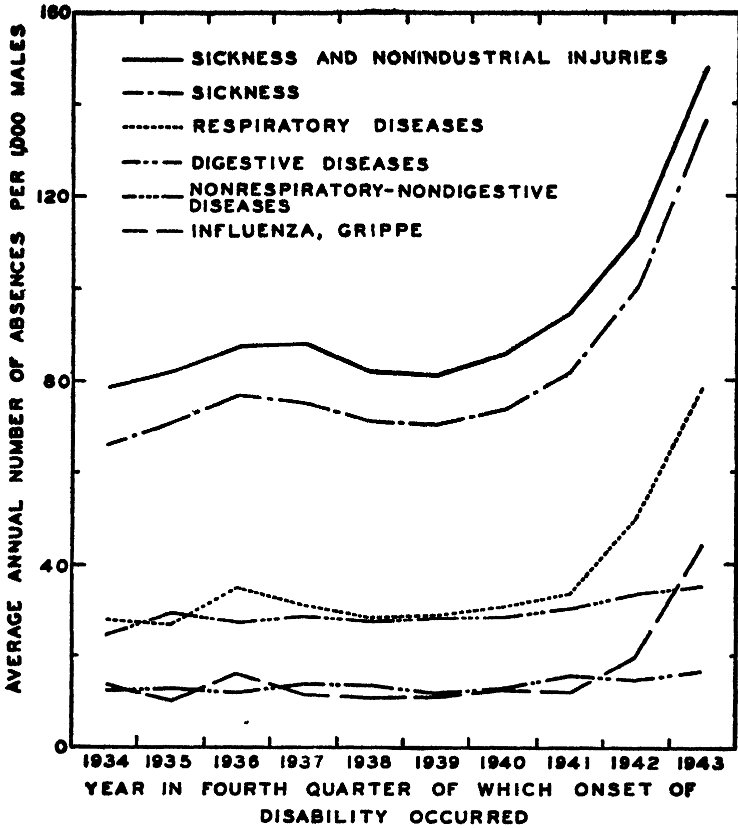


FIGURE 1 —Average annual number of absences per 1,000 males on account of sickness and nonindustrial injuries disabling for 8 consecutive calendar days or longer, variation of the fourth quarter rates with time, experience of male employees in various industries, 1934–43, inclusive

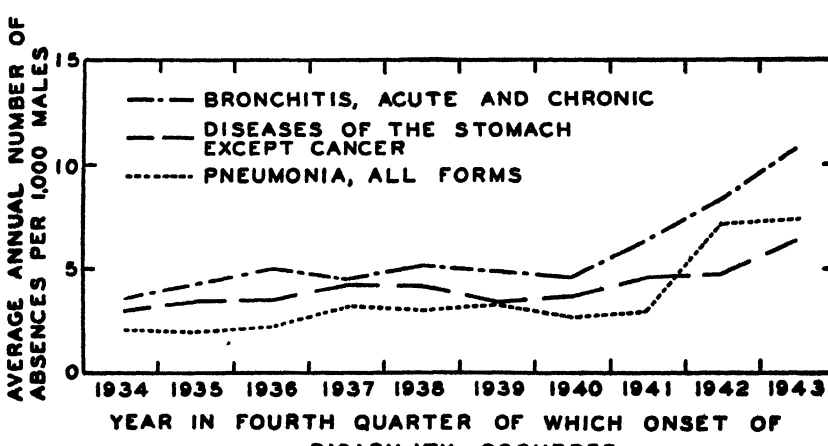


FIGURE 2 —Average annual number of absences per 1,000 males on account of certain selected causes disabling for 8 consecutive calendar days or longer, variation of the fourth quarter rates with time; experience of male employees in various industries, 1934–43, inclusive.

PREVALENCE OF COMMUNICABLE DISEASES IN THE UNITED STATES

March 26–April 22, 1944

The accompanying table summarizes the prevalence of nine important communicable diseases, based on weekly telegraphic reports from State health departments. The reports from each State for each week are published in the PUBLIC HEALTH REPORTS under the section "Prevalence of disease." The table gives the number of cases of these diseases for the 4 weeks ended April 22, the number reported for the corresponding period in 1943, and the median for the years 1939–43.

DISEASES ABOVE MEDIAN PREVALENCE

Measles.—The number of cases of measles dropped from about 306,000 during the preceding week to 126,248 for the 4 weeks ended April 22. Compared with preceding years the current incidence was about 20 percent above the 1943 figure for this period and more than 30 percent above the 1939–43 median. All sections of the country contributed to the excess. In 5 of the 9 geographic regions the number of cases was more than twice the normal seasonal expectancy and smaller increases were reported from each of the other 4 regions.

Meningococcus meningitis.– The number of cases (2,005) of this disease reported during the current period was about 85 percent of the number reported for the corresponding period in 1943, but it was about 9 times the 1939–43 median. Practically every section of the country was represented by States with a relatively high incidence, viz, New York (212 cases), Illinois (153), Pennsylvania (141), Ohio (137), California (136), Michigan (106), Missouri (87), Tennessee and Texas (69 each), Delaware (57), and Connecticut (37)— more than 60 percent of the total cases reported occurred in those 12 States. The incidence was higher than last year in only 3 sections, but every section reported an increase over the preceding 5-year median; the excesses ranged from 4.5 times the median in the South Atlantic region to more than 18 times the median in the East North Central region.

Poliomyelitis.—For the country as a whole this disease was only slightly above the normal seasonal level, 80 cases, as compared with a 5-year median of 74 cases. A comparison of geographic regions, however, shows that in the Middle Atlantic region there were twice as many cases as might have been expected; in the West South Central region the number of cases (20) was 2.5 times the median, while in the Pacific region the number of cases (21) was 3.5 times the median; in all other sections the situation was more favorable.

Scarlet fever.—For the current 4-week period there were 29,070 cases of scarlet fever reported, an increase over the 1939–43 median of

approximately 12,000 cases. All sections of the country contributed to the increase of this disease. The greatest increase was reported from the Pacific region, where the number of cases (3,161) was about 4 times the 5-year median, and the smallest increase was reported from the East South Central region, with an increase over the median of less than 30 percent.

DISEASES BELOW MEDIAN PREVALENCE

Diphtheria.—For the 4 weeks ended April 22 there were 781 cases of diphtheria reported, as compared with 903 for the corresponding period in 1943, and a preceding 5-year median of 1,055 cases. The highest incidence was reported from the Pacific region, the number of cases (147) in that region being about 80 percent greater than the 5-year median. The number of cases occurring in the New England region was slightly above normal, but in all other regions the incidence was relatively low. For the country as a whole the incidence was the lowest on record for this period.

Influenza.—The number of cases (8,650) of influenza was less than 70 percent of the 1939–43 median for this period. In the New England region the number of cases was 4 times the 5-year median, but other regions reported a comparatively low incidence. After reaching an unusually high level earlier in the year, the incidence of influenza for the country as a whole dropped during the current period to the lowest level since 1938; in that year, which was the lowest on record, the cases reported for this period totaled approximately 4,800.

Smallpox.—For the current period there were 37 cases of smallpox reported, as compared with 105 cases in 1943, and a median of 146 cases for the preceding 5 years. The Mountain region reported 8 cases as compared with a 5-year median of 2 cases, but in all other sections the situation was most favorable.

Typhoid and paratyphoid fever.—While the number of cases (255) of this disease was slightly higher than the number reported for the corresponding period in 1943, it was only about 80 percent of the 1939–43 median. In the Pacific section the number of cases was almost twice the 5-year median, and in the Mountain section the incidence was about normal, but all other regions reported very appreciable declines from the normal seasonal expectancy.

Whooping cough.—The number of cases of this disease was also relatively low, 6,805 cases being reported for the current period, as compared with a 5-year median of 14,592 cases. The situation was favorable in all sections of the country, but especially so in the Middle Atlantic and East North Central sections, where the incidence was the lowest in the 7 years for which these data are available.

Number of reported cases of 9 communicable diseases in the United States during the 4-week period Mar. 26–Apr. 22, 1944, the number for the corresponding period in 1943, and the median number of cases reported for the corresponding period, 1939–43

Division	Current period	1943	5-year median	Current period	1943	5-year median	Current period	1943	5-year median
	Diphtheria			Influenza [1]			Measles [2]		
United States	781	903	1,055	8,650	12,335	12,584	126,248	104,809	96,649
New England	29	14	24	108	27	27	8,474	10,200	7,754
Middle Atlantic	99	163	163	72	145	145	20,955	26,935	10,294
East North Central	99	176	176	427	510	976	26,395	26,587	9,652
West North Central	60	62	83	189	108	298	10,424	8,226	7,228
South Atlantic	114	118	176	2,486	4,171	4,240	22,005	7,035	9,832
East South Central	68	62	86	606	1,076	1,262	3,443	4,341	1,634
West South Central	136	152	168	3,809	5,255	5,255	15,895	5,963	5,963
Mountain	29	74	70	609	681	706	4,643	7,577	3,930
Pacific	147	82	82	344	362	1,232	14,014	7,945	7,945
	Meningococcus meningitis			Poliomyelitis			Scarlet fever		
United States	2,005	2,390	225	80	81	74	29,070	17,096	17,096
New England	130	274	14	1	3	2	2,499	3,091	1,315
Middle Atlantic	440	523	52	10	5	5	6,540	4,423	4,574
East North Central	460	272	25	7	5	9	7,992	4,247	5,632
West North Central	152	143	9	4	5	5	3,385	1,552	1,552
South Atlantic	252	441	56	9	6	10	2,836	1,120	871
East South Central	175	248	35	5	14	7	782	475	620
West South Central	145	163	22	20	7	8	566	492	336
Mountain	82	79	6	3	14	5	1,309	855	451
Pacific	169	247	12	21	22	6	3,161	841	778
	Smallpox			Typhoid and paratyphoid fever			Whooping cough [2]		
United States	37	105	146	255	244	308	6,805	17,158	14,592
New England	0	0	0	7	17	14	527	1,217	1,291
Middle Atlantic	0	0	0	40	37	54	960	3,164	3,276
East North Central	5	38	38	27	37	37	848	3,343	3,346
West North Central	8	8	48	8	10	15	362	1,031	531
South Atlantic	3	13	6	63	52	79	1,533	2,413	2,265
East South Central	4	6	15	19	23	35	463	765	666
West South Central	8	32	33	39	40	51	946	2,903	1,399
Mountain	8	2	2	15	16	14	547	577	815
Pacific	1	6	14	37	12	20	619	1,745	1,722

[1] Mississippi and New York excluded; New York City included.
[2] Mississippi excluded.

MORTALITY, ALL CAUSES

For the 4 weeks ended April 22 there were 37,645 deaths reported to the Bureau of the Census by 93 large cities, an average of 9,411 deaths per week. The average number of deaths reported for the corresponding weeks in 1940–43 was 9,047. The number of deaths was higher during each week of the current 4-week period than the average for its corresponding week in 1940–43, and the total number of deaths for the 4 weeks represented an increase over the preceding 3-year average of about 4 percent. The greatest excesses in the number of deaths were reported from the Middle Atlantic and East North Central regions. The Mountain region alone reported a decrease in the number of deaths from the preceding 3-year average.

TOXICITY AND POTENTIAL DANGERS OF PENTA-ERYTHRITOL-TETRANITRATE (PETN) [1]

A Review

The toxicity and potential dangers of penta-erythritol-tetranitrate were studied. Methods for the determination of aliphatic nitrate esters and of nitrite in biological fluids are described. It was shown that *in vitro* and *in vivo* Petn is a very stable compound as compared with erythritol-tetranitrate and nitroglycerine. Petn is absorbed from the gastro-intestinal tract, through the lungs, and, at best, very slowly through the skin. In man Petn has a very moderate effect on the circulatory functions, less than that observed with erythritol-tetranitrate. It is neither a primary irritant nor a strong sensitizer. In dogs Petn causes changes of the respiration, circulation, and spinal pressure similar to those observed with erythritol-tetranitrate and nitroglycerine, being, however, less potent than the former and much less effective than the latter. Continued feeding of Petn in doses of 2 mg. per kilo over a period of 1 year does not cause in rats untoward effects on their growth, their blood picture, or their lungs, livers, kidneys, spleens, femora, or brains, and specifically no injuries of the vascular walls. The customary methods of good housekeeping and of personal hygiene should be sufficient to prevent injurious effects in workers handling this material.

DEATHS DURING WEEK ENDED APRIL 29, 1944

[From the Weekly Mortality Index, issued by the Bureau of the Census, Department of Commerce]

	Week ended Apr. 29, 1944	Corresponding week, 1943
Data for 93 large cities of the United States:		
Total deaths	9,332	10,079
Average for 3 prior years	9,070	
Total deaths, first 17 weeks of year	169,772	171,544
Deaths under 1 year of age	609	671
Average for 3 prior years	588	
Deaths under 1 year of age, first 17 weeks of year	10,737	11,942
Data from industrial insurance companies:		
Policies in force	66,339,327	65,501,549
Number of death claims	12,498	12,537
Death claims per 1,000 policies in force, annual rate	9.8	10.0
Death claims per 1,000 policies, first 17 weeks of year, annual rate	11.1	10.6

[1] Toxicity and potential dangers of penta-erythritol-tetranitrate (Petn). By W. F. von Oettingen, D. D. Donahue, A. H. Lawton, A. R. Monaco, H. Yagoda, and P. J. Valaer. Pub. Health Bull. No. 282. Government Printing Office, 1944. For sale by the Superintendent of Documents, Washington 25, D. C. Price 10 cents.

PREVALENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED MAY 6, 1944

Summary

A further decline occurred in the incidence of meningococcus meningitis. A total of 382 cases was reported, as compared with 449 last week, 605 for the corresponding week last year, and a 5-year (1939-43) median of 47. Decreases were reported in all of the nine geographic divisions except the South Atlantic, Mountain, and Pacific areas. Eight States reporting currently 15 or more cases each are as follows (figures for last week in parentheses):

Increases—Pennsylvania 40 (34), Texas 21 (18), California 25 (22); *decreases*— New York 50 (56), New Jersey 16 (21), Ohio 31 (41), Illinois 22 (43), Missouri 15 (22). The number of cases reported for the year to date is 9,465, as compared with 8,817 for the same period last year and a 5-year median of 897.

The incidence of both measles and scarlet fever declined. Totals reported are 26,067 for measles and 6,672 for scarlet fever, as compared with 29,995 and 7,439, respectively, for last week. The current figures are approximately 10 and 73 percent above the respective 5-year medians, and the cumulative figures (454,635 for measles and 112,268 for scarlet fever) are 38 percent and 56 percent, respectively, above the medians.

Current totals reported for diphtheria, influenza, poliomyelitis, typhoid fever, and whooping cough are below both the figures for last week and the corresponding 5-year medians. A total of 15 cases of smallpox was reported, as compared with 9 for the preceding week, and a 5-year median of 71. The current figure is below that for any corresponding week of prior years.

Cumulative figures for other diseases included in the following table (figures for the corresponding period last year in parentheses) are as follows: Anthrax 17 (25), dysentery, all forms 5,652 (4,863), encephalitis, infectious, 207 (200), leprosy 11 (8), Rocky Mountain spotted fever 15 (40), tularemia 181 (291), typhus fever, endemic, 722 (817).

A total of 8,922 deaths was registered for the week in 93 large cities of the United States, as compared with 9,322 last week and a 3-year (1941-43) average of 8,772. The aggregate for the year to date is 178,684, as compared with 181,060 for the same period last year.

Telegraphic morbidity reports from State health officers for the week ended May 6, 1944, and comparison with corresponding week of 1943 and 5-year median

In these tables a zero indicates a definite report, while leaders imply that, although none was reported, cases may have occurred.

Division and State	Diphtheria			Influenza			Measles			Meningitis		
	Week ended		Median 1939-43	Week ended		Median 1939-43	Week ended		Median 1939-43	Week ended		Median 1939-43
	May 6, 1944	May 8, 1943		May 6, 1944	May 8, 1943		May 6, 1944	May 8, 1943		May 6, 1944	May 8, 1943	
NEW ENGLAND												
Maine	2	0	0	1	------	1	238	15	142	1	2	0
New Hampshire	0	0	0	2	------	------	23	74	13	0	8	0
Vermont	0	0	1	------	------	------	145	276	72	0	1	0
Massachusetts	8	2	2	------	------	------	952	1,762	1,264	8	33	2
Rhode Island	1	1	1	23	------	------	102	11	66	2	14	0
Connecticut	0	0	1	------	------	1	610	442	442	7	9	1
MIDDLE ATLANTIC												
New York	12	11	15	[1] 1	[1] 13	[1] 13	1,624	3,628	2,181	50	110	7
New Jersey	1	5	4	------	17	6	1,252	2,090	906	16	12	3
Pennsylvania	10	5	19	2	1	------	818	1,678	1,678	40	34	5
EAST NORTH CENTRAL												
Ohio	8	16	16	10	14	9	591	889	500	31	21	1
Indiana	4	1	6	3	22	11	261	486	216	9	10	0
Illinois	5	29	20	40	13	13	719	1,942	396	22	26	1
Michigan	5	5	4	1	63	2	1,067	2,286	629	13	12	1
Wisconsin	0	0	0	51	38	38	2,298	1,854	1,389	5	5	1
WEST NORTH CENTRAL												
Minnesota	6	3	1	1	------	1	511	390	390	4	1	0
Iowa	2	1	2	------	------	------	278	249	249	2	4	0
Missouri	0	2	2	3	3	2	183	282	282	15	13	2
North Dakota	1	0	1	55	27	6	6	182	31	1	0	1
South Dakota	0	0	0	------	------	------	39	86	23	0	3	1
Nebraska	3	1	1	8	3	3	220	157	157	2	0	0
Kansas	2	2	4	------	1	3	633	645	645	5	5	0
SOUTH ATLANTIC												
Delaware	0	0	0	------	------	------	30	75	23	3	7	1
Maryland	7	1	3	6	10	7	664	223	292	10	25	3
District of Columbia	0	1	1	1	2	------	179	77	121	0	5	1
Virginia	4	4	5	143	180	143	680	452	452	14	21	3
West Virginia	5	3	5	15	13	19	415	52	60	5	6	2
North Carolina	4	7	11	1	8	10	1,136	353	543	8	21	2
South Carolina	2	2	5	229	422	400	349	134	134	4	9	2
Georgia	1	4	3	2	29	38	128	229	164	3	5	1
Florida	2	2	2	3	10	10	221	87	220	10	12	0
EAST SOUTH CENTRAL												
Kentucky	1	4	4	165	7	7	153	290	95	3	20	3
Tennessee	6	4	4	26	32	27	196	393	190	10	19	1
Alabama	5	4	5	21	60	49	322	156	198	11	9	1
Mississippi	1	5	5	------	------	------	------	------	------	4	13	1
WEST SOUTH CENTRAL												
Arkansas	0	4	4	53	16	58	162	122	122	0	3	0
Louisiana	7	2	2	9	5	5	124	173	92	2	5	2
Oklahoma	4	4	5	34	14	61	507	52	148	3	2	2
Texas	30	13	19	379	512	511	2,993	647	1,120	21	15	2
MOUNTAIN												
Montana	3	0	1	5	12	12	105	145	81	2	0	0
Idaho	0	0	0	------	2	------	174	58	57	0	6	0
Wyoming	1	0	0	------	6	------	104	162	67	0	0	0
Colorado	4	11	11	19	18	18	299	576	384	3	1	0
New Mexico	0	0	0	8	3	1	136	14	35	0	0	0
Arizona	1	0	1	36	42	56	150	36	98	1	0	0
Utah	0	1	0	25	13	13	33	179	179	1	6	0
Nevada	0	0	0	------	------	------	132	16	2	1	0	0
PACIFIC												
Washington	2	7	1	------	------	------	307	389	389	2	14	1
Oregon	3	1	1	16	30	20	191	332	226	3	4	1
California	27	20	11	29	71	70	3,612	1,186	1,186	25	59	1
Total	190	188	211	1,426	1,732	1,732	26,067	26,082	23,979	382	605	47
18 weeks	4,184	4,739	5,070	329,607	70,068	141,425	454,635	340,806	329,134	9,465	8,817	897

[1] New York City only.

Telegraphic morbidity reports from State health officers for the week ended May 6, 1944, and comparison with corresponding week of 1943 and 5-year median—Con.

Division and State	Poliomyelitis			Scarlet fever			Smallpox			Typhoid and paratyphoid fever		
	Week ended		Median 1939–43	Week ended		Median 1939–43	Week ended		Median 1939–43	Week ended		Median 1939–43
	May 6, 1944	May 8, 1943		May 6, 1944	May 8, 1943		May 6, 1944	May 8, 1943		May 6, 1944	May 8, 1943	
NEW ENGLAND												
Maine	0	0	0	55	12	14	0	0	0	0	0	0
New Hampshire	0	0	0	11	14	4	0	0	0	0	0	0
Vermont	0	0	0	9	15	7	0	0	0	1	0	0
Massachusetts	0	0	0	365	472	196	0	0	0	0	0	0
Rhode Island	0	0	0	22	28	12	0	0	0	2	0	0
Connecticut	0	0	0	100	[illegible]	77	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
MIDDLE ATLANTIC												
New York	1	3	1	595	553	553	0	0	0	2	7	5
New Jersey	0	0	0	235	148	223	0	0	0	0	0	3
Pennsylvania	0	0	0	757	262	388	0	0	0	7	0	7
EAST NORTH CENTRAL												
Ohio	0	2	1	546	320	320	0	6	1	4	0	9
Indiana	0	0	0	255	78	103	4	1	6	2	2	1
Illinois	0	0	0	419	156	287	0	0	2	1	2	4
Michigan	0	1	0	224	112	285	0	0	1	1	1	1
Wisconsin	0	1	0	384	315	167	2	1	1	2	0	0
WEST NORTH CENTRAL												
Minnesota	0	0	0	161	70	77	0	0	2	0	0	0
Iowa	0	0	0	225	57	53	2	0	2	0	0	1
Missouri	0	0	0	129	91	81	0	0	3	3	1	1
North Dakota	0	0	0	30	11	9	0	0	1	0	0	1
South Dakota	0	0	0	39	13	15	0	3	1	0	0	0
Nebraska	0	0	0	66	17	23	1	0	0	0	1	0
Kansas	2	1	1	81	37	46	1	0	0	0	0	1
SOUTH ATLANTIC												
Delaware	0	0	0	20	0	9	0	0	0	0	0	0
Maryland	0	0	0	260	136	40	0	0	0	1	2	2
District of Columbia	0	0	0	146	22	14	0	0	0	1	0	1
Virginia	0	0	0	84	39	31	0	0	0	3	1	1
West Virginia	0	0	0	85	25	30	0	0	0	1	1	3
North Carolina	0	0	0	35	37	23	0	0	0	2	2	1
South Carolina	0	0	0	1	2	3	0	0	0	3	1	3
Georgia	0	0	0	25	6	12	0	0	0	0	2	2
Florida	3	0	0	5	12	3	0	0	0	2	4	4
EAST SOUTH CENTRAL												
Kentucky	0	0	0	76	65	65	0	0	0	1	0	6
Tennessee	0	0	0	62	41	42	0	1	0	1	1	2
Alabama	0	0	0	9	11	12	1	3	1	3	2	2
Mississippi	------	------	------	2	5	5	1	------	1	1	------	1
WEST SOUTH CENTRAL												
Arkansas	1	0	0	7	0	1	0	0	0	2	2	2
Louisiana	0	0	0	6	10	6	1	0	0	3	2	2
Oklahoma	1	0	1	27	12	18	0	0	0	2	0	0
Texas	1	4	2	63	48	41	0	2	5	8	3	6
MOUNTAIN												
Montana	1	0	0	48	21	21	0	0	0	0	0	1
Idaho	0	0	0	37	112	5	0	0	0	0	0	0
Wyoming	0	0	0	16	3	9	0	0	0	0	0	0
Colorado	0	0	0	61	59	30	1	0	0	0	0	0
New Mexico	0	0	0	30	4	6	0	0	0	1	1	1
Arizona	0	4	0	13	9	6	0	0	0	0	1	0
Utah	0	0	0	73	46	11	0	0	0	0	6	0
Nevada	0	0	0	7	0	0	0	0	0	0	0	0
PACIFIC												
Washington	0	0	0	404	37	35	0	0	0	0	0	0
Oregon	1	0	0	124	18	13	0	0	4	0	0	1
California	3	10	3	238	174	126	1	0	0	6	4	4
Total	14	26	19	6,672	3,859	3,859	15	17	71	67	50	102
18 weeks	389	455	418	112,268	71,761	71,761	218	476	828	1,290	1,029	1,405

Telegraphic morbidity reports from State health officers for the week ended May 6, 1944, and comparison with corresponding week of 1943 and 5-year median—Con.

Division and State	Whooping cough			Week ended, May 6, 1944								
	Week ended		Median 1939–43	Anthrax	Dysentery			Encephalitis, infectious	Leprosy	Rocky Mt. spotted fever	Tularemia	Typhus fever
	May 6, 1944	May 8, 1943			Amebic	Bacillary	Unspecified					
NEW ENGLAND												
Maine	32	41	30	0	0	0	0	0	0	0	0	0
New Hampshire	1	6	6	0	0	0	0	0	0	0	0	0
Vermont	7	12	24	0	0	0	0	0	0	0	0	0
Massachusetts	93	136	166	0	0	3	0	2	0	0	0	0
Rhode Island	4	34	21	0	0	0	0	0	0	0	0	0
Connecticut	18	22	46	0	0	1	0	1	0	0	0	0
MIDDLE ATLANTIC												
New York	124	294	294	0	0	8	0	2	0	0	0	0
New Jersey	24	181	181	0	3	0	0	1	0	0	0	1
Pennsylvania	105	208	327	0	0	0	0	0	0	0	1	0
EAST NORTH CENTRAL												
Ohio	74	154	173	0	2	0	0	1	0	0	0	0
Indiana	18	47	47	0	0	0	1	0	0	0	0	0
Illinois	34	157	157	0	0	0	0	4	0	0	0	0
Michigan	83	239	157	0	0	0	0	0	0	0	0	0
Wisconsin	68	209	143	0	1	0	0	1	0	0	0	0
WEST NORTH CENTRAL												
Minnesota	12	90	30	0	2	0	0	0	0	0	0	0
Iowa	0	21	21	0	0	0	0	0	0	0	0	0
Missouri	6	22	15	0	0	0	0	1	0	0	0	0
North Dakota	1	28	13	0	0	0	0	0	0	0	0	0
South Dakota	0	13	1	0	0	0	0	0	0	0	0	0
Nebraska	9	8	8	0	0	0	0	0	0	0	0	0
Kansas	44	136	40	0	0	0	0	1	0	0	0	0
SOUTH ATLANTIC												
Delaware	1	0	5	0	0	0	0	0	0	0	0	0
Maryland	24	128	88	0	0	0	1	0	0	1	0	0
District of Columbia	3	28	14	0	0	0	38	0	0	0	0	0
Virginia	63	118	61	0	0	0	0	0	0	0	0	0
West Virginia	31	51	33	0	0	0	0	0	0	0	0	0
North Carolina	97	203	203	0	0	0	0	0	0	0	0	3
South Carolina	98	67	67	0	1	11	0	0	0	0	1	0
Georgia	14	11	21	0	0	3	0	0	0	0	0	8
Florida	42	52	52	0	0	0	1	0	0	0	0	14
EAST SOUTH CENTRAL												
Kentucky	75	39	79	0	0	0	0	0	0	0	0	0
Tennessee	29	72	47	0	0	0	0	0	0	0	0	1
Alabama	37	56	44	0	2	0	0	0	0	0	0	9
Mississippi	0	------	------	0	0	0	0	0	0	0	1	2
WEST SOUTH CENTRAL												
Arkansas	16	45	27	0	1	7	0	0	0	0	2	0
Louisiana	1	5	5	0	1	0	0	0	0	0	1	3
Oklahoma	39	37	33	0	0	0	0	0	0	0	0	0
Texas	195	612	347	0	10	248	0	2	1	0	0	30
MOUNTAIN												
Montana	3	15	15	0	0	0	0	0	0	0	1	0
Idaho	2	14	3	0	0	0	0	0	0	0	0	0
Wyoming	6	3	2	0	0	0	0	0	0	1	0	0
Colorado	53	23	23	0	0	0	0	0	0	0	1	0
New Mexico	4	4	29	0	0	0	0	0	0	0	0	0
Arizona	14	32	26	0	0	0	49	0	0	0	0	0
Utah	48	66	66	0	0	0	0	0	0	0	1	0
Nevada	36	3	0	0	0	0	0	1	0	1	0	0
PACIFIC												
Washington	28	46	64	0	0	0	0	0	0	0	0	0
Oregon	8	19	19	0	0	0	0	0	0	0	0	0
California	93	582	354	0	1	10	0	1	1	0	0	1
Total	1,817	4,389	3,977	0	24	291	90	18	2	3	9	72
18 weeks	32,524	72,653	72,625	17	473	3,959	1,220	207	11	15	181	722
18 weeks, 1943	------	------	------	25	528	3,495	840	200	8	40	291	817

WEEKLY REPORTS FROM CITIES

City reports for week ended April 22, 1944

This table lists the reports from 88 cities of more than 10,000 population distributed throughout the United States, and represents a cross section of the current urban incidence of the diseases included in the table.

	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
NEW ENGLAND												
Maine:												
Portland	0	0	-----	0	40	1	0	0	8	0	0	3
New Hampshire:												
Concord	0	0	-----	0	2	0	1	0	0	0	0	1
Vermont:												
Barre	0	0	-----	0	0	0	0	0	0	0	0	0
Massachusetts:												
Boston	1	0	-----	1	163	3	14	0	75	0	0	8
Fall River	0	0	-----	0	18	0	0	0	2	0	0	2
Springfield	0	0	-----	0	41	0	2	0	46	0	1	3
Rhode Island:												
Providence	0	0	-----	1	128	2	3	0	17	0	0	2
Connecticut:												
Bridgeport	0	1	-----	0	26	2	2	0	0	0	0	0
Hartford	0	0	-----	0	7	0	0	0	20	0	0	0
New Haven	0	0	-----	0	113	2	2	0	3	0	0	0
MIDDLE ATLANTIC												
New York:												
Buffalo	0	0	-----	0	7	1	5	0	9	0	0	1
New York	15	3	2	2	1,334	34	79	0	304	0	0	36
Rochester	0	0	-----	0	12	1	4	0	6	0	0	1
Syracuse	0	0	-----	1	4	2	2	0	11	0	0	3
New Jersey:												
Camden	1	0	-----	0	11	1	4	0	64	0	1	0
Newark	0	0	1	1	255	4	8	0	15	0	0	5
Trenton	0	0	-----	0	13	0	3	0	16	0	0	1
Pennsylvania:												
Philadelphia	0	0	6	4	45	9	40	0	132	0	2	7
Pittsburgh	2	0	3	3	15	11	16	0	11	0	0	2
Reading	0	0	-----	0	3	1	2	0	0	0	0	0
EAST NORTH CENTRAL												
Ohio:												
Cincinnati	0	0	-----	1	41	5	2	0	61	0	0	6
Cleveland	0	1	4	0	69	4	9	0	83	0	0	14
Columbus	0	0	-----	0	57	2	5	0	3	0	0	8
Indiana:												
Fort Wayne	0	0	-----	0	2	0	2	0	5	0	0	0
Indianapolis	3	0	-----	0	59	2	6	0	41	0	0	1
South Bend	0	0	-----	0	1	0	0	0	5	0	0	1
Terre Haute	0	0	1	0	3	0	1	0	3	0	0	0
Illinois:												
Chicago	1	0	3	0	166	25	21	0	199	0	0	13
Springfield	0	0	-----	0	36	0	6	0	5	0	0	2
Michigan:												
Detroit	3	0	-----	0	120	8	17	0	135	0	1	9
Flint	0	0	-----	0	0	0	0	0	3	0	0	1
Grand Rapids	0	0	-----	1	49	2	0	0	6	0	0	0
Wisconsin:												
Kenosha	0	0	-----	0	179	0	0	0	3	0	0	0
Milwaukee	0	1	-----	0	215	6	3	0	79	0	0	10
Racine	0	0	-----	0	51	0	0	0	3	0	0	3
Superior	0	0	-----	0	3	0	0	0	32	0	0	0
WEST NORTH CENTRAL												
Minnesota:												
Duluth	0	0	-----	0	65	0	4	0	25	0	0	4
Minneapolis	2	0	-----	0	286	3	2	0	40	0	0	4
St. Paul	0	0	-----	0	317	1	2	0	29	0	1	5
Missouri:												
Kansas City	0	0	-----	0	115	2	3	0	36	0	0	1
St. Joseph	0	0	-----	0	6	1	0	0	7	0	1	1
St. Louis	0	1	-----	0	115	6	11	0	71	0	0	5
North Dakota:												
Fargo	0	0	-----	0	1	1	1	0	4	0	0	0
Nebraska:												
Omaha	8	0	-----	0	38	0	5	0	22	0	0	1
Kansas:												
Topeka	0	0	-----	0	75	0	0	0	8	0	1	0
Wichita	0	0	1	0	0	0	3	0	6	0	0	0

City reports for week ended April 22, 1944—Continued

	Diphtheria cases	Encephalitis, infectious, cases	Influenza Cases	Influenza Deaths	Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
SOUTH ATLANTIC												
Delaware:												
Wilmington	0	0		0	1	1	1	0	3	0	0	0
Maryland:												
Baltimore	10	0	2	1	679	7	10	0	112	0	1	17
Cumberland	0	0		0	0	0	0	0	0	0	0	0
Frederick	0	0		0	2	0	0	0	2	0	0	0
District of Columbia:												
Washington	0	0	3	1	238	3	9	0	137	0	0	2
Virginia:												
Lynchburg	0	0		0	15	0	0	0	2	0	0	1
Richmond	0	0	1	2	63	1	4	0	5	0	0	0
Roanoke	0	0		0	17	0	0	0	0	0	0	1
West Virginia:												
Charleston	0	0		0	1	0	0	0	15	0	0	0
Wheeling	0	0		0	27	0	1	0	15	0	0	0
North Carolina:												
Raleigh	0	0		0	0	0	0	0	1	0	0	4
Wilmington	0	0		0	66	0	1	1	0	0	0	13
Winston-Salem	0	0		0	59	0	0	0	0	0	0	0
South Carolina:												
Charleston	0	0	2	1	6	2	3	0	1	0	0	0
Georgia:												
Atlanta	1	0	3	0	19	2	2	0	16	0	0	0
Brunswick	0	0		0	0	2	0	0	0	0	0	3
Savannah	0	0	1	1	4	0	1	0	0	0	0	0
Florida:												
Tampa	0	0	2	0	12	2	0	0	6	0	0	0
EAST SOUTH CENTRAL												
Tennessee:												
Memphis	0	0	2	0	39	5	3	0	39	0	1	2
Nashville	0	0		0	27	0	1	0	11	0	0	1
Alabama:												
Birmingham	0	0	2	1	13	1	5	0	1	0	0	0
Mobile	1	0		0	8	1	0	0	2	0	0	0
WEST SOUTH CENTRAL												
Arkansas:												
Little Rock	0	0		0	8	0	1	0	0	0	0	0
Louisiana:												
New Orleans	1	0	3	1	29	5	14	1	8	0	0	0
Texas:												
Dallas	4	0	1	1	224	0	3	0	9	0	0	9
Galveston	1	0		0	58	0	3	0	0	0	0	0
Houston	0	0		0	24	0	4	0	1	0	0	1
San Antonio	3	0		1	18	3	3	0	1	0	0	0
MOUNTAIN												
Montana:												
Billings	0	0		0	17	0	1	0	0	0	0	0
Great Falls	0	0		0	8	0	0	0	2	0	0	0
Helena	0	0		0	2	0	0	0	0	0	0	0
Missoula	0	0		0	7	0	0	0	2	0	0	0
Idaho:												
Boise	0	0		0	3	0	0	0	1	0	0	0
Colorado:												
Denver	0	0	2	3	114	3	5	0	28	0	0	10
Pueblo	0	0		0	17	0	0	0	5	0	0	0
Utah:												
Salt Lake City	0	0		1	24	0	0	0	26	0	0	3
PACIFIC												
Washington:												
Seattle	0	0		2	48	0	6	0	32	0	0	9
Spokane	0	0		0	81	0	2	0	14	0	0	6
Tacoma	1	0		0	13	0	0	0	41	0	0	[illegible]

City reports for week ended April 22, 1944—Continued

	Diphtheria cases	Encephalitis, infectious, cases	Influenza Cases	Influenza Deaths	Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
PACIFIC—continued												
California:												
Los Angeles	5	0	11	0	401	4	5	1	24	0	0	8
Sacramento	1	0	1	1	40	0	7	0	2	0	0	3
San Francisco	0	0	2		218	1	8	1	36	0	0	0
Total	64	7	59	32	6,956	185	393	4	2,253	0	10	252
Corresponding week, 1943	56	0	121	36	7,902	221	424	6	1,707	1	15	1,100
Average, 1939–43	69		165	[1] 33	[2] 6,195		[1] 419		1,566	4	16	1,180

[1] 3-year average.
[2] 5-year median.

Dysentery, amebic.—Cases: New York, 1; Columbus, 1; Chicago, 1; St. Louis, 1; Tampa, 1; Denver, 1.
Dysentery, bacillary.—Cases: Providence, 1; New York, 15; Charleston, S. C., 10; Los Angeles, 3.
Dysentery, unspecified.—Cases: Baltimore, 2; San Antonio, 18; Great Falls, 1.
Typhus fever, endemic.—Cases: Philadelphia, 1; Savannah, 1; Birmingham, 2; Little Rock, 1; New Orleans, 1.

Rates (annual basis) per 100,000 population, by geographic groups, for the 88 cities in the preceding table (estimated population, 1942, 34,475,200)

	Diphtheria case rates	Encephalitis, infectious, case rates	Influenza Case rates	Influenza Death rates	Measles case rates	Meningitis, meningococcus, case rates	Pneumonia death rates	Poliomyelitis case rates	Scarlet fever case rates	Smallpox case rates	Typhoid and paratyphoid fever case rates	Whooping cough case rates
New England	2.7	2.7	0.0	5.5	1,473	27.4	65.7	0.0	468	0.0	2.7	52
Middle Atlantic	8.0	1.3	5.4	4.9	760	28.6	72.9	0.0	254	0.0	1.3	25
East North Central	4.1	1.2	4.7	1.2	615	31.6	42.2	0.0	390	0.0	0.6	40
West North Central	19.6	2.0	2.0	0.0	1,995	27.4	60.7	0.0	486	0.0	5.9	41
South Atlantic	18.6	0.0	23.7	10.1	2,045	33.8	54.1	1.7	533	0.0	1.7	69
East South Central	6.0	0.0	23.8	6.0	518	41.7	53.6	0.0	316	0.0	6.0	18
West South Central	28.1	0.0	12.5	9.4	1,127	25.0	87.4	3.1	59	0.0	0.0	31
Mountain	0.0	0.0	16.1	32.2	1,548	24.2	48.4	0.0	516	0.0	0.0	105
Pacific	12.3	0.0	24.5	5.3	1,404	8.8	49.1	3.5	261	0.0	0.0	37
Total	9.7	1.1	8.9	4.9	1,055	28.1	59.6	0.6	342	0.0	1.5	38

TERRITORIES AND POSSESSIONS

Hawaii Territory

Honolulu—Dengue fever.—For the period April 1–15, 1944, 17 cases of dengue fever were reported in Honolulu, T. H., bringing the total number of cases reported from the beginning of the outbreak to 1,473.

Plague—In rodents and ectoparasites.—Five rats found in Paauhau area, Hamakua District, Island of Hawaii, T. H., have been proved positive for plague on the dates specified: April 2, 1944, 3 rats; April 3, 1 rat; April 5, 1 rat. On March 7, 1944, 53 fleas recovered from 176 rodents trapped during the month of February 1944, in Hamakua Mill area, Hamakua District, Island of Hawaii, T. H., were proved positive for plague.

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—Week ended April 8, 1944.—During the week ended April 8, 1944, cases of certain communicable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox		3	35	166	329	40	28	35	147	783
Diphtheria	1	5	1	33	1	3	1		1	46
Dysentery (bacillary)				2						2
German measles				79	67	6	59	15	37	263
Influenza		11	2		42		1		10	66
Measles		105	17	888	665	220	57	184	22	2,158
Meningitis, meningoccus				6	1	1			3	11
Mumps		3	69	157	208	27	12	35	80	591
Scarlet fever	1	8	7	55	219	61	27	72	77	527
Tuberculosis (all forms)		2	4	317	59	9	14	20	43	468
Typhoid and paratyphoid fever				52	6		2	11		71
Undulant fever				2					1	3
Whooping cough		30		60	39	1	5	8	16	159

FINLAND

Notifiable diseases—January 1944.—During the month of January 1944, cases of certain notifiable diseases were reported in Finland as follows:

Disease	Cases	Disease	Cases
Cerebrospinal meningitis	19	Paratyphoid fever	135
Chickenpox	856	Pneumonia (all forms)	2,674
Conjunctivitis	17	Poliomyelitis	14
Diphtheria	1,925	Puerperal fever	59
Dysentery	7	Rheumatic fever	392
Gastroenteritis	1,602	Scabies	3,033
Gonorrhea	708	Scarlet fever	1,102
Hepatitis, epidemic	810	Syphilis	477
Influenza	2,536	Typhoid fever	35
Laryngitis	64	Undulant fever	1
Lymphogranuloma, inguinale	1	Vincent's angina	15
Measles	11,011	Whooping cough	921
Mumps	499		

JAMAICA

Notifiable diseases—4 weeks ended April 8, 1944.—For the 4 weeks ended April 8, 1944, cases of certain notifiable diseases were reported in Kingston, Jamaica, and in the island outside of Kingston, as follows:

Disease	Kingston	Other localities	Disease	Kingston	Other localities
Cerebrospinal meningitis		1	Leprosy		1
Chickenpox	7	54	Puerperal sepsis	1	3
Diphtheria	3	3	Tuberculosis	28	42
Dysentery	1	1	Typhoid fever	7	79
Erysipelas	1		Typhus fever	3	

NEW ZEALAND

Notifiable diseases—4 weeks ended March 25, 1944.—For the 4 weeks ended March 25, 1944, certain notifiable diseases were reported in New Zealand as follows:

Disease	Cases	Deaths	Disease	Cases	Deaths
Cerebrospinal meningitis	21	1	Puerperal fever	9	1
Diphtheria	64	1	Scarlet fever	430	
Dysentery (bacillary)	36	1	Tetanus	2	
Erysipelas	36		Trachoma	4	
Food poisoning	6		Tuberculosis (all forms)	206	43
Ophthalmia neonatorum	1		Typhoid fever	10	1
Poliomyelitis	11	1	Undulant fever	2	

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

NOTE.—Except in cases of unusual incidence, only those places are included which had not previously reported any of the above-mentioned diseases, except yellow fever, during the current year. All reports of yellow fever are published currently.

A table showing the accumulated figures for these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.

(Few reports are available from the invaded countries of Europe and other nations in war zones.)

Plague

British East Africa—Uganda.—For the week ended April 1, 1944, 1 case of plague with 1 death was reported in Uganda, British East Africa.

French West Africa—Dakar.—For the week ended April 22, 1944, 1 death from plague (confirmed) and 2 suspected deaths from plague were reported in Dakar, French West Africa.

Madagascar—Tananarive.—Plague has been reported in Tananarive, Madagascar, as follows: January 1944, 2 cases, 1 death; February 1944, 1 case, 1 death.

Morocco—Casablanca.—For the period April 1–10, 1944, 1 case of plague was reported in Casablanca, Morocco.

Smallpox

British East Africa—Uganda.—Smallpox has been reported in Uganda, British East Africa, as follows: Weeks ended March 25, 1944, 100 cases; April 1, 180 cases; April 8, 170 cases.

India.—For the week ended April 1, 1944, 260 cases of smallpox with 75 deaths were reported in Bombay and for the week ended April 8, 1944, 407 deaths from smallpox were reported in Calcutta, India.

Italy—Palermo.—For the month of March 1944, 19 cases of smallpox were reported in Palermo, Italy.

Nigeria.—For the week ended March 25, 1944, 278 cases of smallpox with 34 deaths were reported in Nigeria.

Typhus Fever

Arabia—Western Aden Protectorate.—According to a report dated March 30, 1944, it is stated that about 100 cases of typhus fever have occurred in Western Aden Protectorate, Arabia, in an area west of a line running due south from Dala to the sea. The most southerly cases reported are in an area forty miles northwest of Aden.

Irish Free State—Galway County—Oughterard.— For the week ended April 1, 1944, 1 case of typhus fever was reported in Oughterard, Galway County, Irish Free State.

Syria and Lebanon.—Typhus fever has been reported in Syria and Lebanon as follows: Weeks ended March 18, 1944, 65 cases, March 25, 33 cases.

Union of South Africa—Cape Province.—During the month of January 1944, 1,692 deaths from typhus fever have occurred in the Transkei region of Cape Province, Union of South Africa. For the weeks ended March 18 and 25, 116 cases and 85 cases respectively, have been reported. According to press reports fresh outbreaks have occurred in the districts of Bedford, Adelaide, and Alice in the Ciskei area 100 miles from Port Elizabeth.

Yellow Fever

Belgian Congo—Leopoldville.—For the week ended March 11, 1944, 1 case of yellow fever with 1 death was reported in Leopoldville, Belgian Congo.

FEDERAL SECURITY AGENCY

UNITED STATES PUBLIC HEALTH SERVICE

THOMAS PARRAN, *Surgeon General*

DIVISION OF PUBLIC HEALTH METHODS

G. ST. J. PERROTT, *Chief of Division*

The PUBLIC HEALTH REPORTS, first published in 1878 under authority of an act of Congress of April 29 of that year, is issued weekly by the United States Public Health Service through the Division of Public Health Methods, pursuant to the following authority of law: United States Code, title 42, sections 7, 30, 93; title 44, section 220.

It contains (1) current information regarding the prevalence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

The PUBLIC HEALTH REPORTS is published primarily for distribution, in accordance with the law, to health officers, members of boards or departments of health, and other persons directly or indirectly engaged in public health work. Articles of special interest are issued as reprints or as supplements, in which forms they are made available for more economical and general distribution.

Requests for and communications regarding the PUBLIC HEALTH REPORTS, reprints, or supplements should be addressed to the Surgeon General, United States Public Health Service, Washington, D. C. Subscribers should remit direct to the Superintendent of Documents, Washington, D. C.

Librarians and others should preserve their copies for binding, as the Public Health Service is unable to supply the general demand for bound copies. Indexes will be supplied upon request.

UNITED STATES GOVERNMENT PRINTING OFFICE, WASHINGTON : 1944

For sale by the Superintendent of Documents, Washington, D. C.

Price 5 cents. Subscription price $2.50 a year

Public Health Reports

VOLUME 59 MAY 19, 1944 NUMBER 20

IN THIS ISSUE

Experimental Chemotherapy of Burns and Shock

CONTENTS

Public Health Reports

Vol. 59 • MAY 19, 1944 • *No. 20*

THE CHEMOTHERAPY OF BURNS AND SHOCK

VI. STANDARDIZED HEMORRHAGE IN THE MOUSE. VII. THERAPY OF EXPERIMENTAL HEMORRHAGE[1]

By HERBERT TABOR, *Passed Assistant Surgeon*, HERMAN KABAT, *Pharmacologist*, and SANFORD M. ROSENTHAL, *Principal Pharmacologist, United States Public Health Service*

VI. Standardized Hemorrhage in the Mouse

In common with the problems of burns and trauma, investigations concerned with the early mortality following hemorrhage have been hindered by the lack of satisfactory methods. The chief difficulties have been the variable response of the experimental animal to the injury and the inability to employ a sufficient number of animals to equalize these variations; contributory factors such as the inadequate standardization of the animal, the injury, and environmental conditions, as well as lack of uniformity in the criteria of shock and the basis of evaluation of therapy, have resulted in many conflicting reports in the large literature in this field *(1, 2, 3)*. Recent attempts to control these difficulties have been made *(3, 4, 5, 6)*. Even here variations in susceptibility of unknown origin remain which render the control of conditions open to question unless simultaneous comparison is possible *(7)*.

By the use of simple techniques in mice, permitting the study of large numbers of animals, and by employing mortality as the criterion, standardized conditions for the evaluation of therapy in burn and traumatic shock have been developed *(8, 9)*. Where adequate groups of animals were employed, satisfactory reproducibility of results has been obtained.

The present report deals with an attempt to apply similar methods to the study of hemorrhage. It was found that the cut tails of mice or rats, immersed in warm oxalate solution, will bleed readily up to the point of death. This permits the study of measured hemorrhage

[1] From the Division of Physiology, National Institute of Health.

upon a large number of unanesthetized animals during the course of one experiment, an important factor in obtaining uniform conditions.

METHOD

Mice are placed in glass tubes, one end of which is covered with wire screening, the other plugged with a stopper containing a hole at the periphery, through which the tail protrudes. An assortment of tubes has been prepared so that the proper size can be selected for the individual mouse. Tubes that are too large permit the animal to turn around, while if the tubes are too small there is interference with respiratory movements.

The tubes are placed upon a shelf built along the edge of a water bath 5 feet in length. They are conveniently held in place by rubber bands tacked to the shelf. The tails of the animals project into measuring cylinders held in place in the water bath by means of a rack. The cylinders are made of 10 cc. pipettes cut off at both ends, one end of which is annealed or tightly stoppered. The cylinders are filled with 1.3 percent sodium oxalate and adjusted to a given mark after the solutions have reached equilibrium with the temperature of the bath, which is kept at 43° C. by means of a thermoregulator. Temperature control of the bath is necessary in order to obtain accurate volumetric readings.

After placing the mouse in the holding tube the tail is dipped into a beaker of oxalate solution to compensate for any solution the tail would take up from the measuring cylinder. The tip of the tail is cut off with scissors, the animal fastened horizontally upon the rack with the tail placed in the cylinder so that the lower portion is submerged in the oxalate solution. When the amount of bleeding approaches the desired quantity, the tail is raised from the solution at frequent intervals for the purpose of reading the volume of bleeding above the original mark on the cylinder.

It is convenient to divide the animals into weight groups and to calculate the desired amount of bleeding for each group at the beginning of the experiment. As an example, all mice weighing between 16 and 17 gm. are placed together and the bleeding calculated on a basis of the average weight of the group, thereby facilitating the handling of a large number of animals. An interval of 1 minute is ordinarily allowed between the onset of hemorrhage in the different mice, and as the time required for bleeding is usually 5 to 15 minutes, this limits the number of mice under observation at a given time.

After the desired volume has been bled, the distal end of the tail is ligated with thread and the animal removed from its container and placed in a numbered jar. Between bleedings the measuring cylinders are stoppered with small corks.

The albino mice used in these experiments were 13- to 20-gm. females. Food was withheld for 18 hours, but care was taken to make water accessible up to the time of the first bleeding. The diet was Ralston dog pellets. No anesthesia was used. At least three people are needed for a large-scale experiment: one to handle the animals, one to observe and record bleeding volumes, and one to administer treatment. With this technique, as many as 90 mice can be studied in 1 day.

The above method may also prove useful for the study of standardized anemia or chronic blood loss in experiments upon small laboratory animals.

RESULTS IN NORMAL MICE

The majority of mice died at the completion of, or shortly after, a fatal hemorrhage; delayed mortality was irregular and infrequent (2.8 percent among 351 control animals). For the purpose of evaluating therapy, bleeding in two stages was therefore adopted. The first bleeding consisted of 2.25 percent of body weight, which was the maximum blood loss that could be sustained under these conditions without a high mortality. The second bleeding was begun 1 hour after the beginning of the first and in most experiments carried to a maximum of 5 percent of body weight. The final mortality includes any mice dying within 24 hours. Animals dying from the first bleeding were discarded, and comparison was made upon a basis of the bleeding volume and mortality resulting from the second bleeding. With uniform conditions and with an inbred strain of mice, the group mortality curves showed good agreement, although unexplained variations from day to day occur. Due to limitation in the supply of mice at the National Institute of Health, it was necessary to use outside sources, as a result of which greater variations were encountered. The control mortality curve represents an index of susceptibility, and since this is determined during each experiment, corrections for this variable can be made.

In this investigation, the therapeutic effect of a given agent was based upon at least 3 to 5 experiments, with a total of 40 or more mice in each treated group. Similar numbers of animals were employed in the control groups. While significant differences exist between individual experiments, a comparison of the composite control curves shows good agreement. The mortality in the composite groups at a blood loss of 4.5 percent body weight ranged from 62.5 to 82.5 percent, with a mean mortality among 302 mice of 75 percent. At a blood loss of 5 percent of body weight the mortality range was 91 to 100 percent, with a mean of 95.5 percent (fig. 1).[2]

[2] The error of sampling in proportions involving groups of 40 can be calculated from $\sqrt{pq/n}$. At 75 percent mortality, the range 2 S.E. equals 14 percent, while at 95 percent the range 2 S.E. equals 7 percent. Thus, the variation in our percent mortalities in the different control groups is within the range of chance variation.

In two groups of experiments comprising 39 mice each, the bleeding was stopped at 4 and 4.5 percent of body weight in order to estimate the total mortality at these points. At 4 percent blood loss the mean mortality was 31 percent, while at 4.5 percent it was 76.5 percent.

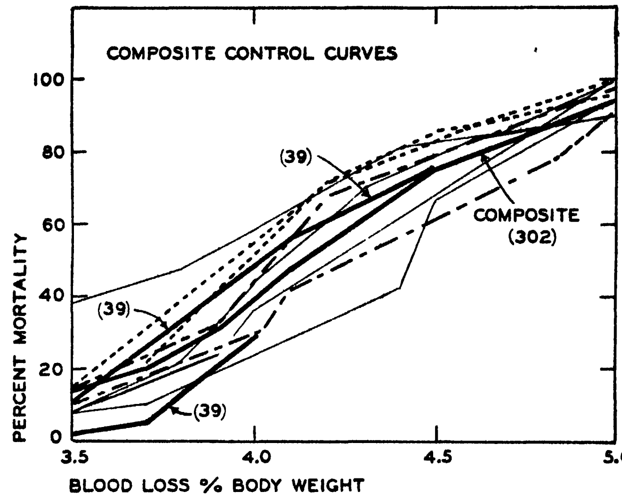


FIGURE 1.—The mortality curves of normal mice subjected to hemorrhage. Each curve represents 3 or more experiments with 25 to 50 mice. The heavy continuous lines present a summary of all untreated mice in which bleeding was terminated at 4 percent body weight (39 mice), 4.5 percent body weight (39 mice), and 5 percent body weight (302 mice). All curves are plotted from deaths which occur during the course of bleeding, except the end points which include any deaths within 24 hours.

Throughout these experiments, all animals dying as a result of the first bleeding (2.25 percent of body weight) are excluded from the series.

STATISTICAL TREATMENT

Statistical comparison of the data was made by converting the curves to straight lines by the probit method of Bliss as adapted for cumulative results (*10*). The bleeding volumes equivalent to 50 percent mortalities and their respective standard errors were determined for the different curves. From this the significance of their differences was calculated and expressed as P (probability) values.

VII. Therapy of Experimental Hemorrhage

Therapy was administered between the first and second hemorrhage. In the case of oral administration, it was given by stomach tube within a few minutes after completion of the first bleeding, in order to allow time for absorption. Intravenous therapy, through the tail veins, was given as nearly as possible between 20 minutes after the first bleeding and 20 minutes before the second, allowing 1 to 2 minutes for each injection. Because of the short period of time available for therapy, this was limited to one oral or intravenous dose.

An individual experiment comprised 30 to 45 mice which were taken in rotation for one or more forms of therapy or to serve as controls.

Under the conditions of these experiments it was necessary to administer treatment during the course of severe hemorrhage, rather than in the post-hemorrhagic shock state. The severity of the hemorrhage prior to treatment is evidenced by the fact that 10.5 percent of 1,360 mice died as a result of the first hemorrhage and were excluded from the analysis of the data.

Although treatment was given only during the course of the hemorrhage, the end point is based upon mortality, and it is probable that the method may offer a valid means of comparing the effectiveness of therapeutic procedures for later phases of hemorrhage, although specific information on this point is not available. In actual clinical practice the conditions we have employed are encountered frequently.

COMPARISON OF MOUSE SERUM WITH 0.9 PERCENT NaCl

In preliminary experiments it was shown that 0.8 to 1.0 cc. of 0.9 percent NaCl (5.0 to 6.0 percent body weight) administered orally is equal or superior to comparable intravenous therapy. Statistical

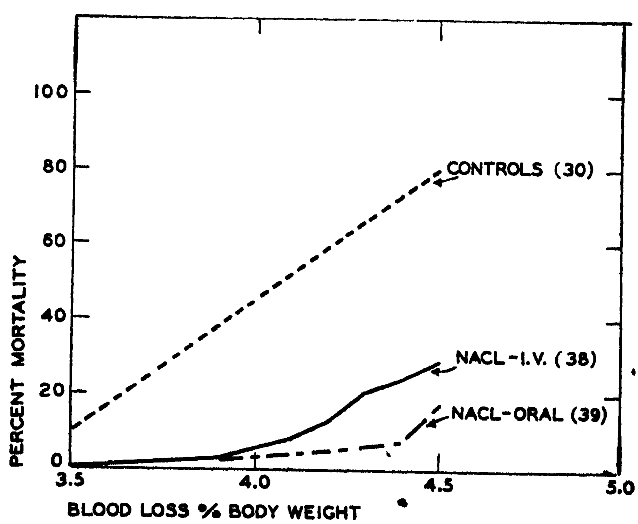


FIGURE 2.—Comparison of 0.9 percent NaCl orally and intravenously; 0.8 to 1 cc. given orally shortly after the first bleeding, and intravenously in two equally divided doses. In all subsequent experiments, therapy limited to one dose. The bleeding was terminated at 4.5 percent body weight. In all figures, numbers in parentheses refer to number of mice in each group.

analysis shows that the differences in response are not significant ($P=0.7$), while with both routes the mortality curves are significantly ($P=<0.001$) below the controls (fig. 2, table 4). All subsequent therapy with saline solutions has been limited to the oral route.

TABLE 1.—*Comparison of mouse serum i. v. with whole blood i. v. and with 0.9 percent NaCl orally in hemorrhage. Hemoglobin concentration and hemoglobin lost per gm. mouse are estimated upon the shed blood*

Experiment number	Therapy	Route	Number mice	Percent body weight bled Deaths 2.5–3.5	3.6–3.9	4.0–4.2	4.3–4.5	4.6–4.8	4.9–5.1	Mortality (percent)	Average weight (gm.)	Hemoglobin concentration, percent (gm.)	Hemoglobin lost per gm. mouse (mg.)
1 A	Plasma 0.5 cc.	i. v.	15			1		2	2	33.3	17.6	13.0	6.4
1 B	Serum 0.5 cc.	i. v.	10				1	3	2	60			
1 C	do	i. v.	15	1	5	1	3	3	1	93.3			
1 A	NaCl 0.5 cc	oral	16			1		5	2	50	17.4	12.0	5.9
1 B	do	do	10				2	2	2	60			
1 C	do	do	15		1	4	6	1	2	93.3			
1 A	Controls		20	2	5	4	3	1	2	85	18.5	13.9	6.0
1 B	do		20		5	4	7	3		95			
1 C	do		10	3	5	2				100			
2 A	Serum 0.5 cc.	i. v.	10		2			1	5	80	17.5	11.6	5.8
2 B	do	i. v.	9	1		1	1	1		44.4			
2 C	do	i. v.	9				2	1	1	44.4	18.1	11.0	5.3
2 D	do	i. v.	11					1	2	27.3			
2 E	do	i. v.	11		1		2	1	4	72.7	18.3	11.4	6.1
2 A	Whole blood 0.5 cc.	i. v.	10							0	17.7	14.7	7.5
2 B	do	i. v.	10							0			
2 C	do	i. v.	11	1			1	2	1	45.5	17.0	14.3	7.3
2 D	do	i. v.	9					1		11			
2 E	do	i. v.	9			1			3	44.4	18.2	12.9	6.6
2 A	Controls		10			2	4		4	100	17.5	13.5	6.0
2 B	do		10		1	2	6	1		100			
2 C	do		10	1		2	1	2	3	90	17.0	12.5	5.4
2 D	do		10	3	1	2	3		1	100			
2 E	do		10			3	3	3	1	100	17.3	13.4	6.0

In this and all subsequent tables experiments with the same number indicate that they were run simultaneously.

In most of the studies mouse serum rather than plasma has been employed because the use of anticoagulants is avoided and because the serum, when processed as in previous experiments (*8*), has proved of uniformly low toxicity. Intravenous injection of 1 cc. is tolerated without symptoms.

A comparison of 0.5 cc. of serum (3.0 to 3.6 percent body weight) orally and intravenously shows a lower mortality by the latter route although the results are not statistically significant (P=0.3) (fig. 3,

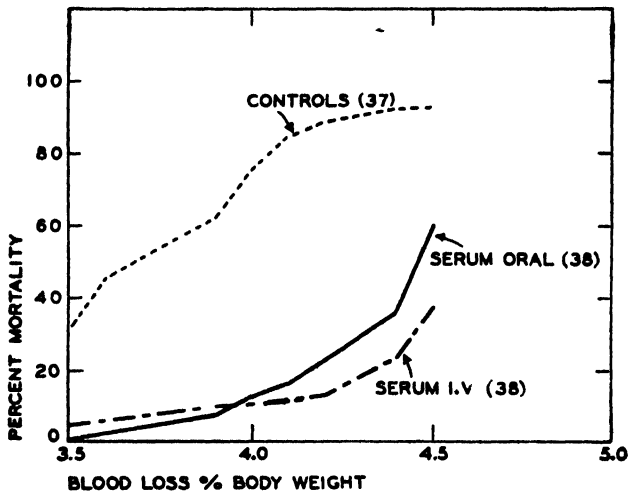


FIGURE 3.—Comparison of 0.5 cc. of mouse serum administered orally and intravenously. Bleeding terminated at 4.5 percent body weight. Thirty-eight mice in each treated group.

table 4). By both routes the mortality curves are significantly (P=<0.001) lower than the controls.

All important comparisons are based upon experiments in which the agents to be compared and the controls were tested simultaneously. Three such experiments, comprising a total of 40 mice treated with 0.5 cc. serum, 41 with 0.5 cc. of saline, and 50 controls show an equal effectiveness for serum and saline in reducing mortality (fig. 4, table 1). A summary of all experiments in which 0.5 cc. serum intravenously was employed, when compared with those employing 0.5 cc. of saline orally, shows, at a blood loss of 4.5 percent, a mortality of 28 percent in 128 mice receiving serum, 22.7 percent in 119 mice given saline, and 73.5 (125 mice) and 75.5 percent (130 mice) in their respective controls. At 5 percent blood loss the mortalities for these groups are 55.5 percent for serum (90 mice), 68 percent for saline (81 mice), and 91.5 percent (100 mice) and 88.5 percent (95 mice) for their respective controls.

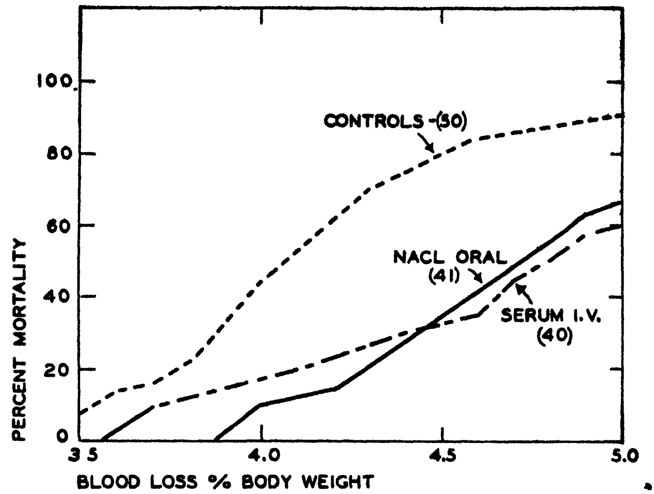


FIGURE 4.—The similar therapeutic effects of 0.5 cc. mouse serum i. v. and 0.5 cc. of 0.9 percent NaCl orally.

COMPARISON OF WHOLE BLOOD WITH SERUM

The view is generally held, supported by laboratory evidence, that plasma can in large measure replace whole blood in the treatment of hemorrhage (*11*, *12*, *13*).

Whole blood was obtained immediately prior to our experiments by decapitating large mice and collecting the blood in a receptacle con-

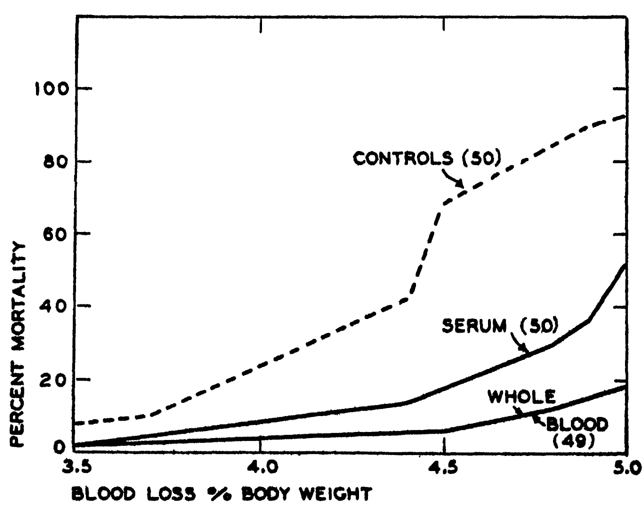


FIGURE 5.—Comparison of 0.5 cc. whole blood i. v. with 0.5 cc. serum i. v.

taining sufficient ammonium citrate (this salt used in order to avoid Na and K) to give a final concentration of 2.1 mg. per cc. In one series heparinized blood and plasma were used. The blood was fil-

tered through sterile gauze before use; all samples were tolerated by normal mice in doses up to 1 cc. intravenously.

In a group of three experiments with 49 mice receiving 0.5 cc. whole blood intravenously, 50 mice receiving 0.5 cc. serum intravenously, and 50 controls, the mortality at 5 percent body weight blood loss was 18 percent for whole blood, 52 percent for serum, and 92 percent among the controls (fig. 5, table 1).

Because of the inaccuracy in statistical treatment of mortality curves where only a small percentage of animals die, and which there-

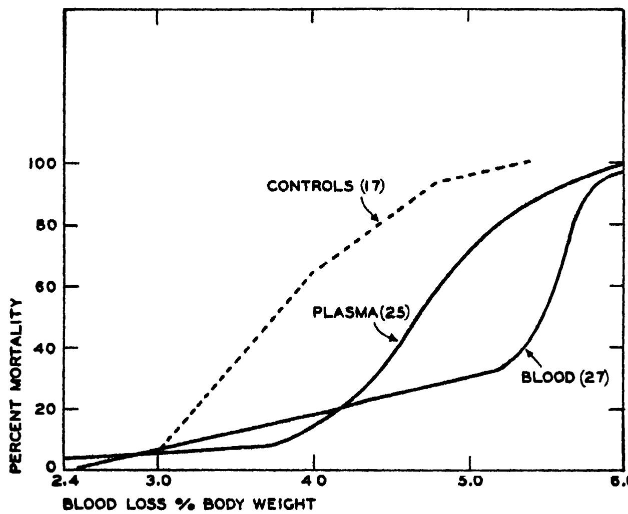


FIGURE 6.—Comparison of 0.5 cc. heparinized blood with plasma i. v., in which bleeding was continued until death of all animals.

fore represent only a limited part of the complete curve, an experiment was carried out for comparison of whole blood with heparinized plasma wherein the bleeding was carried to the death of all animals: In this way complete mortality curves were obtained (fig. 6).

Statistical analysis of these results reveals that whole blood is significantly better than plasma ($P = < 0.001$).

In that part of the curve corresponding to the previous experiments, the results are in agreement; the mortality at 5 percent blood loss was 30 percent for the whole blood, 72 percent for plasma, and 96 percent for the controls.

COMPARISON OF WHOLE BLOOD WITH SALINE

Since serum and saline give approximately similar results, it is to be expected that whole blood would be superior to saline; it remained to be determined whether several times the volume of salt solution orally would equal the effect of a given volume of blood given intravenously. While the amount of blood that can be injected intrave-

nously within a short time is limited, a considerably larger amount of saline can be administered orally without hazard. Apart from this, the availability of whole blood and of facilities for its administration is often limited in military and civilian emergencies.

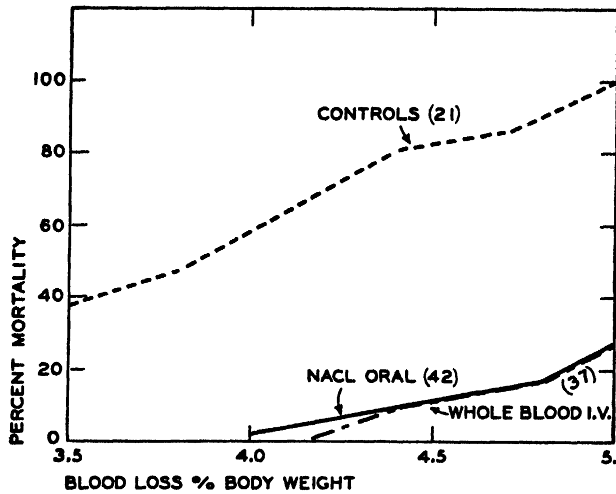


FIGURE 7.—The identical response of 0.5 cc. of whole blood i. v. and 0.9 to 1.4 cc. of saline orally.

Three experiments were performed, including 37 mice receiving 0.5 cc. of whole blood intravenously (3.0 to 3.6 percent body weight), 42 mice receiving 0.9 to 1.4 cc. of saline (8 percent of body weight) orally, and 21 controls. Equal degrees of effectiveness were obtained

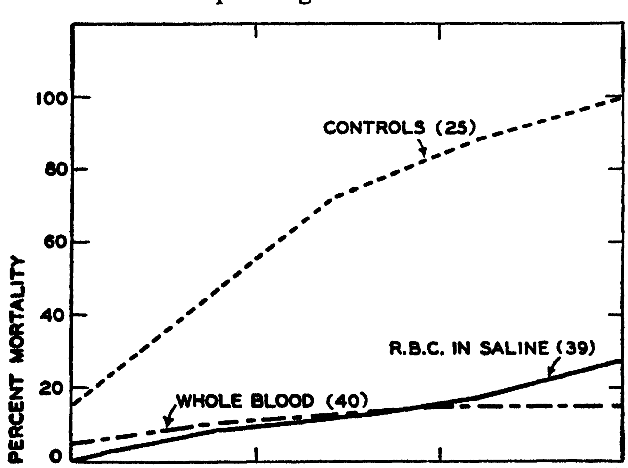


FIGURE 8.—The similar effects of 0.5 cc. of whole blood i. v. to 0.5 cc. of erythrocytes suspended in saline, i. v.

under these conditions for saline and whole blood; the mortality at 5 percent blood loss was 26.5 percent for blood, 28 percent for saline, and 100 percent for the controls (fig. 7, table 2).

TABLE 2.—*Whole blood 0.5 cc. i. v. compared with an equal amount of red cell suspension in saline i. v., and with approximately three times this quantity of saline orally (8 percent body weight=1.2 to 1.6 cc. per mouse)*

Experiment number	Therapy	Route	Number mice	Percent body weight bled Deaths						Mortality (percent)	Average weight (gm.)	Hemoglobin concentration, percent (gm.)	Hemoglobin lost per gm. mouse (mg.)
				2.5–3.5	3.6–3.9	4.0–4.2	4.3–4.5	4.6–4.8	4.9–5.1				
3 A	Whole blood 0.5 cc	i. v	16			1	1	1	4	43.8	17.0	15.0	7.4
3 B	do	i. v	12					1		8.3			
3 C	do	i. v	9				2		1	33.3			
3 A	NaCl 8 percent body weight	oral	17			2	1	2	1	35.3	16.6	11.5	5.5
3 B	do	do	11						1	9			
3 C	do	do	14			1	1		5	50			
3 A	Controls		8	2	2	2			2	100	16.8	13.5	5.6
3 B	do		8	2	1	1	2	1	1	100			
3 C	do		5	3	2					100			
4 A	Whole blood 0.5 cc	i. v	9							0			
4 B	do	i. v	13	2	2		2			46.1			
4 C	do	i. v	18							0			
4 A	RBC in saline 0.5 cc	i. v	10			1			1	20			
4 B	do	i. v	14		2		2	2	1	50			
4 C	do	i. v	15		1		1			13.3			
4 A	Controls		8		3		3		2	100			
4 B	do		8	2	2	3	1			100			
4 C	do		9	2	4	2		1		100			

In other experiments in which similar doses of whole blood and of saline were employed, but done upon different days, the results show good agreement with those obtained above. Eighty-nine additional mice receiving 0.5 cc. (3 to 3.6 percent body weight) of blood intra-

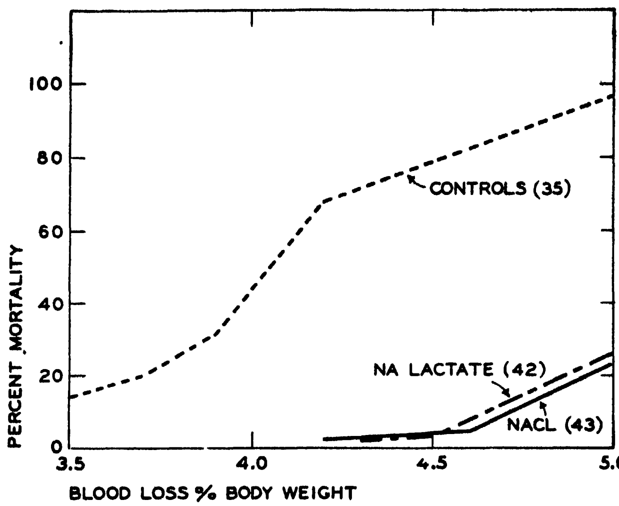


FIGURE 9.—The identical effects of equimolar solutions of NaCl (0.9 percent) and sodium lactate (1.75 percent). Oral administrations of 8 percent body weight in both cases.

venously (figs. 5 and 8, tables 1 and 2) had a final mortality of 16.6 percent, as compared with 85 mice receiving 8 percent body weight of saline orally (fig. 9, table 3) with a final mortality of 25 percent.

It must be concluded that the erythrocytes contribute an important effect in the prevention of death from hemorrhage. Within certain limits, a similar degree of effectiveness can be obtained by increasing the dosage of salt solution orally.

COMPARISON OF WHOLE BLOOD WITH ERYTHROCYTES SUSPENDED IN SALINE

Whole blood was obtained as described; a measured portion was centrifuged, the plasma removed, the red cells washed twice with 0.9 percent saline, and finally made up to the original volume with saline.

These experiments comprised 40 mice receiving 0.5 cc. of whole blood intravenously, 39 mice receiving 0.5 cc. of red cell suspension intravenously, with 25 controls. A similar degree of therapeutic effectiveness was obtained for both agents (fig. 8, table 2).

Since in the erythrocyte suspension plasma is replaced by saline, these results are in agreement with those described above which show an equal response for saline and serum. The results are of practical interest in view of the large quantities of erythrocytes made available by the current blood donations for preparation of plasma.

TABLE 3.—*Comparison of 0.9 percent sodium chloride and 1.75 percent sodium lactate orally in doses of 8 percent body weight. Also, the relative effects in hemorrhage of NaCl, KCl, and H_2O. In experiments 6A and 6B, the bleeding was stopped at 4.5 percent body weight*

Experiment number	Therapy	Route	Number mice	Percent body weight bled — Deaths: 2.5-3.5	3.6-3.9	4.0-4.2	4.3-4.5	4.6-4.8	4.9-5.1	Mortality (percent)	Average weight (gm.)	Hemoglobin concentration, percent (gm.)	Hemoglobin lost per gm. mouse (mg.)
5 A	NaCl 8 percent body weight	oral	10						3	30	16.8	11.7	6.0
5 B	do	do	16					2	3	31	17.0	11.9	[1] 6.0
5 C	do	do	17			1		1	3	29.4			
5 A	Na lactate 8 percent body weight	do	10				1	1	2	40	16.2	12.1	6.0
5 B	do	do	16				1	2	6	56.3	17.0	11.7	[1] 5.8
5 C	do	do	16					1	1	12.5			
5 A	H_2O 8 percent body weight	do	10		3	1	2	2	1	90	15.9	12.8	5.6
5 B	do	do	16		2	4	2	4	3	94	17.0	12.2	[1] 5.5
5 A	Controls		10	2	1	6	1			100	16.2	13.4	5.8
5 B	do		17	2	4	5	1	4	1	100	17.2	13.2	[1] 5.6
5 C	do		8	1	1	2	2		1	87.5			
6 A	H_2O 8 percent body weight	oral	9		1	1	2			[2] 44.4	18.3	12.9	6.3
6 B	do	do	20	2		4	6			[2] 60	19.7	13.2	5.6
6 C	do	do	13		1		1	1	3	46	17.2	12.9	6.3
6 A	Controls		9	1	3	4	1			[2] 100	18.3	13.7	6.0
6 B	do		14	2	6	3				[2] 78.5	20.1	15.2	5.9
6 C	do		15	1		1	5	6	2	100	17.0	14.1	6.4
7 A	NaCl 0.5 cc	oral	10			1		1	5	70	15.6	12.7	6.3
7 B	do	do	10			1	1	1	5	80	15.2	12.2	6.0
7 C	do	do	10			1	1	2	3	70	15.0	11.1	5.4
7 D	do	do	10				1	6		70			
7 A	KCl 0.5 cc	do	10	1	1	1	1	2	1	70	15.8	12.1	5.4
7 B	do	do	10	1	1	1	1	2	4	100	15.4	12.1	5.5
7 C	do	do	10		2	1	4	2		90	14.5	11.6	5.1
7 D	do	do	10		1	2	3	3		90			
7 B	H_2O 0.5 cc	do	10	1		1	2		6	100	15.4	11.9	5.5
7 C	do	do	11		1	1	2	1	4	82	15.0	11.1	5.8
7 D	do	do	10	2	1	2	2	1	2	100			
7 A	Controls		15	3	1		3	2	3	80	14.7	13.7	6.5
7 B	do		10	1	1	2	1	3	1	90	15.4	12.7	5.7
7 C	do		10			3	3	1	3	100	15.1	13.2	5.4
7 D	do		10	2	1	2	2	1	2	100			

[1] Half of these used. This represents determinations on half the animals used.

[2] Bled to 4.5 percent body weight.

COMPARISON OF SODIUM CHLORIDE WITH SODIUM LACTATE

Previous results in the chemotherapy of burn shock (*8*) have shown an equal response with equimolar solutions of several sodium salts—chloride, lactate, succinate, acetate, and bicarbonate. Chloride and lactate were also of equal effectiveness in traumatic shock in mice (*9*). Dr. C. L. Fox, Jr. (*14*) has chosen sodium lactate for the oral therapy of burn shock in man because of its palatability and its effect in combating acidosis. Promising clinical results have been reported by him.

In four experiments a comparison was made between 0.9 percent NaCl and 1.75 percent (equimolar) sodium lactate orally in doses of 8 percent body weight (fig. 9, table 3).

Equal responses were obtained: a final mortality of 28 percent with NaCl (43 mice) and 30 percent with lactate (42 mice). These findings indicate that, in common with burn and traumatic shock, the therapeutic effects of NaCl are primarily a function of the sodium ion.

KCL AND WATER

In previous work upon burn shock in mice, it was found that water was without benefit, if not actually harmful. Isotonic solutions of KCl were harmful, as evidenced by a decrease in survival time in comparison with controls, and by the fact that KCl, when added to NaCl, antagonized the curative action of the latter (*8*). These findings are of value in an understanding of the mechanism of the response to saline; they indicate a therapeutic effect specific for the sodium ion,

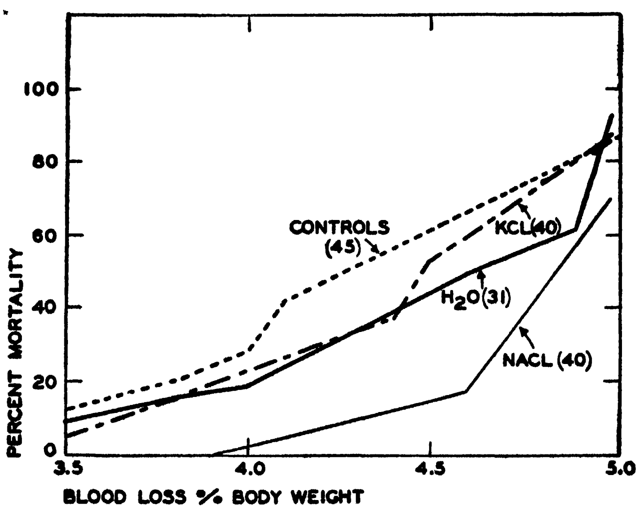


FIGURE 10.—Comparison of NaCl, KCl, and water orally in doses of 0.5 cc per mouse (3 to 3.6 percent body weight).

and are not inconsistent with the possibility of potassium as a toxic factor in shock, a possibility suggested by Scudder (*15*) and investigated by others (*16, 17, 18*).

KCl was administered orally in 1 percent solution, equimolar to 0.9 percent NaCl. Doses of 0.5 cc. (3 to 3.6 percent body weight) were used, representing approximately one-fifth of the L.D.$_{50}$ of KCl orally (*8*). In four experiments with 40 mice no appreciable difference (P=0.21) was observed from the control mortality curve (fig.10, table 3).

In quantities of 3.0 to 3.6 percent body weight, water by mouth gives a mortality curve in hemorrhage that does not deviate significantly (P=0.25) from the control (fig. 10, table 3). With doses of 8 percent body weight the final mortality among 39 mice was 72 percent as compared with 100 percent for 42 controls (fig. 11, table 3). Statistical analysis shows this difference to be significant (P=0.003). The interpretation of the results with KCl and water, when corrected for hemodilution and blood loss, will be discussed below.

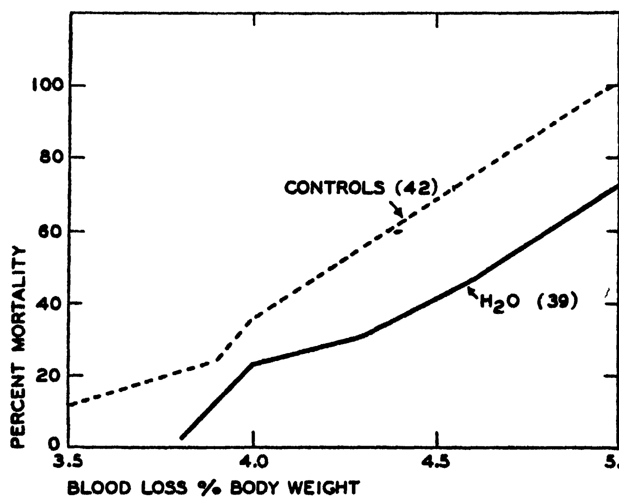


FIGURE 11.—The effect of water orally in amounts of 8 percent body weight

COMPARISON OF ISOTONIC WITH HYPERTONIC SALINE

A series of preliminary tests were made in which 0.9 percent NaCl orally was compared with equivalent doses (7 percent body weight) of 1.8 percent NaCl and with half (3.5 percent body weight) the dose of 1.8 percent NaCl. In this way both the volume and the strength of the solutions were varied in the same experiment.

No significant difference between the three treatments was noted (fig. 12, table 4). This somewhat contradictory result may be taken

to indicate that two opposite influences are involved. The lack of added benefit from increased quantities of 1.8 percent NaCl may be due to the deleterious action of large doses of hypertonic solutions in the presence of blood loss. Similar results were previously obtained in burn shock (*8*). The experiments do suggest that within certain limitations hypertonic solutions of saline are effective; a more extensive investigation is required to establish these limitations.

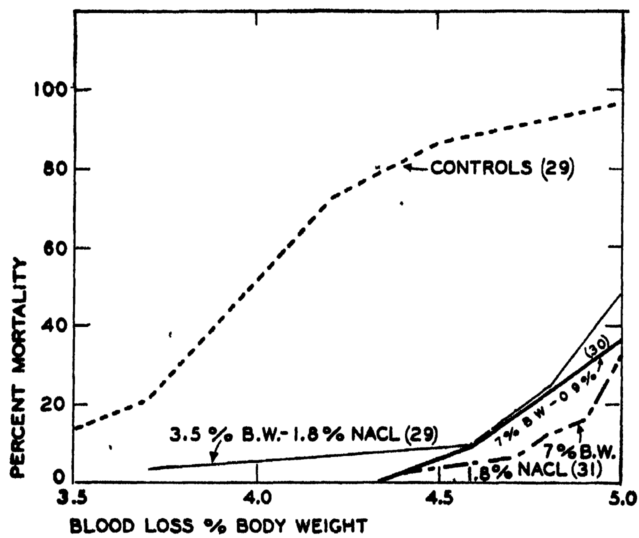


FIGURE 12.—Comparison of 0 9 percent and 1.8 percent NaCl in doses of 7 percent body weight, and 1.8 percent NaCl in doses of 3.5 percent body weight. All treatment given orally.

CORRELATION OF THERAPEUTIC RESPONSE WITH HEMOGLOBIN LOSS AND HEMODILUTION

Hemoglobin determinations were made upon the majority of bloods obtained. The total blood collected from both first and second bleedings was used. In a given experiment the samples from the control group and from each treated group were pooled for these estimations, which were carried out by the acid hematin method with a photoelectric colorimeter.

Since the volumes of blood loss and weights of the animals were known, it was possible to calculate the average hemoglobin concentration in the shed blood, and the average amount of hemoglobin lost per gram of mouse for each group.

The results of these studies are summarized in table 5. It is seen that all forms of fluid therapy except whole blood were attended by hemodilution when compared with their respective controls.

Table 4.—*The relative effects of isotonic and hypertonic NaCl. Also comparisons of oral with i. v. NaCl and oral with i. v. serum. In these latter experiments bleeding was stopped at 4.5 percent body weight*

Experiment number	Therapy	Route	Number mice	Percent body weight bled Deaths 2.5–3.5	3.6–3.9	4.0–4.2	4.3–4.5	4.6–4.8	4.9–5.1	Mortality (percent)	Average weight (gm.)	Hemoglobin concentration, percent (gm.)	Hemoglobin lost per gm. mouse (mg.)
8 A	0.9 percent NaCl	oral	20				2	4	7	65			
8 B	7 percent body weight	do	10					1	1	20			
8 A	1.8 percent NaCl	do	21				1	3	7	52.4			
8 B	7 percent body weight	do	10						2	20			
8 A	1.8 percent NaCl	do	19		1		1	4	8	73.7			
8 B	3.5 percent body weight	do	10					1	2	30			
8 A	Controls		19	3	5	6	3		2	100			
8 B	do		10	1	4	2	1		1	90			
9 A	NaCl 1 cc.	i. v.	18			3	4	1		[1] 44.4	16.8	12.9	5.8
9 B	do	i. v.	10			1	1			[1] 20	18.7	11.9	5.3
9 C	NaCl 0.8 cc.	i. v.	10		1		1	1		[1] 30	15.8	10.5	4.7
9 A	NaCl 1 cc.	oral	19		1		1			[1] 10.5	16.9	14.1	6.4
9 B	do	do	10			1	3			[1] 40	18.6	12.2	5.4
9 C	NaCl 0.8 cc.	do	10				1			[1] 10	16.0	11.9	5.4
9 A	Controls		14	2	6	3				[1] 78.6			
9 BC	do		16	1	3	4	5			[1] 81.2	14.9	13.1	5.1
10 A	Serum 0.5 cc.	i. v.	20	1		2	8			[1] 55	15.1	12.1	5.5
10 B	do	i. v.	10			1				[1] 10	15.2	13.3	6.2
10 C	do	i. v.	8	1			2			[1] 37.5	15.3	12.7	4.3
10 A	do	oral	19			2	11	2		[1] 84	15.0	12.5	5.5
10 B	do	do	10			1	1			[1] 20	15.9	12.5	5.6
10 C	do	do	9		2	1	4	1		[1] 88.8	14.9	12.5	5.0
10 A	Controls		18	4	7	6	1			[1] 100	15.4	15.4	5.3
10 B	do		10	1	2	4				[1] 70	17.1	12.8	5.4
10 C	do		9	4	5					[1] 100	17.1	11.8	4.2

[1] Bled to 4.5 percent body weight.

TABLE 5.—*A summary of the effects of various therapeutic agents upon hemoglobin concentration, total hemoglobin lost, and mortality. Determinations carried out upon shed blood*

Therapy	Number mice	Average weight (gm.)	Hemoglobin concentration, percent (gm.)	Hemoglobin lost per gm. mouse (mg.)	5 percent mortality (percent)
NaCl 8 percent body weight, oral	53	16.5	11.7	5.8	37
Controls	26	16.7	13.34	5.46	100
NaCl 1 cc., i. v.[1]	38	17	12.0	5.4	34
NaCl 1 cc., oral[1]	39	17	13.0	5.9	18
Controls[1]	16	14.9	13.1	5.1	81
NaCl 0.5 cc., oral	46	15.7	12.0	5.9	65
KCl 0.5 cc., oral	30	15.2	11.9	5.33	87
Controls	55	16.3	13.4	5.96	90
H_2O 8 percent body weight	31	16.8	12.7	5.85	72
Controls	33	16.8	13.7	5.85	100
H_2O 8 percent body weight[1]	29	19.0	13.1	5.82	55
Controls[1]	23	19.3	14.5	5.94	86
H_2O 0.5 cc., oral	21	15.2	11.5	5.4	91
Controls	20	15.2	12.95	5.55	95
Serum 0.5 cc., i. v	65	17.9	11.7	5.85	48.5
Controls	70	17.6	13.3	5.83	94.3
Serum 0.5 cc., i. v.[1]	38	15.2	12.5	5.43	39.5
Serum 0.5 cc., oral[1]	38	15.2	12.5	5.4	68
Controls[1]	37	16.3	13.8	5.06	92
Whole blood 0.5 cc., i. v	65	17.3	14.4	7.3	25
Controls	58	17.2	13.1	5.74	98

[1] Bled to 4.5 percent body weight.

In eight salt (3 to 3.6 percent body weight) therapy experiments, the average hemoglobin concentration was 12.3 gm. per 100 cc. (S.E. 0.6), while the paired controls had an average hemoglobin concentration of 13.5 (S. E. 0.4). In eight serum or plasma therapy experiments, the average hemoglobin concentration was 12.3 (S. E. 0.1), while the paired controls had an average hemoglobin concentration of 13.5 (S. E. 0.6). In seven groups treated with water, the average hemoglobin concentration was 12.4 (S. E. 0.3), while the control groups had an average of 13.6 (S. E. 0.3). In all cases, the individual treatment values were lower than those of the paired controls (table 5).

While these observations are of a preliminary nature due to the limited number of observations, certain differences in respect to mechanism are suggested. That hemodilution is not the sole factor in the therapeutic response is shown by the lack of correlation between the mortality results and hemodilution.

In animals treated with salt the mortality is lower than in the controls, even though the hemoglobin losses are substantially the same. This is particularly true with the large doses of salt, in which the mortality is markedly decreased, even though the loss of hemoglobin is at least as great, and possibly greater, than the controls. This marked decrease in mortality is far greater than could possibly be explained by the magnitude of the dilution. Although the number of hemoglobin

determinations is too small to treat adequately statistically, the direction of the findings is the same in all of the separate experiments.

When water is given, a similar degree of hemodilution occurs, but the therapeutic response is less even though the total hemoglobin loss is no greater than the controls. When the mortality curves for water are corrected for hemodilution the values coincide with the controls; this indicates that the beneficial effects of water can be explained entirely on the basis of hemodilution.

In three groups in which KCl was given, although hemodilution was present, the animals died at a rate equal to the controls from a hemoglobin loss less than the controls. The data, however, are insufficient for adequate statistical evaluation.

Following the administration of whole blood, the hemoglobin content increases. As expected, the animals are able to sustain a considerably greater hemoglobin loss than any other group and still have a low mortality.

DISCUSSION

The acute mortality in the mouse as a result of hemorrhage has shown certain similarities in the response to therapy to that of burns and trauma. It must be concluded from these common results that specific electrolytes and fluid are of greater importance than the plasma proteins in influencing the early survival of these animals from an extent of injury that is fatal to the controls. In all experiments the effects of serum or plasma therapy can be duplicated by equivalent volumes of an isotonic solution of NaCl. Evidence that this is a specific effect of an electrolyte is presented in that it is shared by all sodium salts that we have tested, that the potassium ion is ineffective or deleterious, and that water has little or no effect. The existence of a disturbance in sodium metabolism is further shown by the observation of Fox (*14*) that in clinical burns treated with large doses of sodium lactate orally, most of the administered sodium is retained in the body for 2 or more days; his experiments with radio-active sodium indicate that most of this sodium is accumulated in the injured area.

In all three types of injury, highly significant responses are not obtained until the dosage of saline by mouth approaches 10 percent of body weight. This fact must be considered in accounting for much of the negative evidence that has been reported in the literature, where saline therapy has been limited to smaller quantities, administered intravenously. Many experimenters in this field have compared saline with plasma or serum by intravenous routes (*2, 3, 18, 19, 20*). While there is no uniformity in these published results, they are to a large measure in disagreement with our own; some of the workers, however, have reached conclusions similar to ours (*21, 22*). As mentioned at the beginning of this paper, the handicaps

under which most previous investigation has been carried out, and the wide variety of conditions and criteria employed, have contributed largely to this confusion.

Oral therapy has been found at least equal to intravenous administration in burns and trauma as well as hemorrhage. This is an important consideration in view of the large quantities of fluid that seem indicated, and in the possible application of these results to emergency conditions where intravenous medication is not always available, and where time is a large factor in the value of therapy. It should be emphasized that in conditions of collapse, where gastrointestinal absorption may be poor, or where death may be imminent, intravenous therapy should also be used.

It is not surprising that the red cells contribute an effect in hemorrhage beyond that produced by serum or saline, since administration of whole blood or red cells in saline approaches a more complete repair of the injury than is otherwise attained. An evaluation of therapy with whole blood in the acute mortality from burns or trauma has not yet been done.

The applicability to man of the results we have obtained in the various forms of trauma in the mouse can be decided only by clinical trial. Here again the problems of comparative evaluation of therapy are greater than in the laboratory. Even though the best criteria available are employed, it is believed that no valid conclusions can be drawn except from a large number of observations under conditions as uniform as possible.

CONCLUSIONS

A method is described whereby large numbers of unanesthetized small laboratory animals can be subjected simultaneously to standardized hemorrhage.

Fatal hemorrhage in two stages was carried out in mice and therapy administered between bleedings.

Oral therapy with 0.9 percent NaCl is equal to intravenous administration. When given in quantities equivalent to 8 percent of body weight, the majority of animals will survive hemorrhage fatal to controls.

Administration of equal quantities of saline by mouth and mouse serum intravenously produces an identical therapeutic effect. Sodium chloride and sodium lactate in equimolar solutions give equivalent results. Water orally in large amounts brings about a slight reduction in mortality; smaller quantities of water or 1 percent KCl are without effect.

These results, along with those previously published on burn and traumatic shock, indicate that administration of specific electrolytes

and fluid is of greater significance in therapy than administration of plasma proteins.

Whole blood is superior to saline or serum. The response to whole blood intravenously can be equaled by three times the volume of saline given orally. Erythrocytes suspended in saline are as effective as equal volumes of whole blood. These findings indicate the importance of red cells in the therapy of hemorrhage.

The results are analyzed in relation to hemodilution and to hemoglobin loss.

The experimental evidence would seem to justify the clinical trial of sodium salts administered in isotonic solution in part or entirely by mouth in amounts up to 10 percent of body weight, in the treatment of burn shock, traumatic shock, and hemorrhage. In war casualties, particularly where intravenous medication is not immediately available, the procedure may be of value as a first-aid measure.

REFERENCES

(*1*) Wiggers, C. J., and Werle, J. M.: Exploration of a method for standardizing hemorrhagic shock. Proc. Soc. Exp. Biol. & Med., **49**: 604 (1942).

(*2*) Harkins, H. N., and McClure, R. D.: The present status of fluid treatment of traumatic and surgical shock. Ann. Surg., **114**: 891 (1941).

(*3*) Ivy, A. C., Greengard, H., Stein, I. F., Grodins, F. S., and Dutton, D. F.: The effect of various blood substitutes in resuscitation after an otherwise fatal hemorrhage. Surg., Gyn., & Obst., **76**: 85 (1942).

(*4*) Necheles, H., Levinson, S. O., Janota, M., and Weston, R. E.: Studies of the therapy of hemorrhagic shock. Surg., Gyn., & Obst., **77**: 337 (1943).

(*5*) Cleghorn, R. A., Armstrong, J. B., and McKelvey, A. D.: A standardized method for producing shock in dogs by bleeding. Canad. Med. Assoc. J., **49**: 355 (1943).

(*6*) Elman, R., and Lischer, C. E.: Amino-acids, serum, and plasma in the replacement therapy of fatal shock due to repeated hemorrhage. Ann. Surg., **118**: 225 (1943).

(*7*) Blalock, A.: Effects of morphine in experimental shock due to hemorrhage. Arch. Surg., **47**: 326 (1943).

(*8*) Rosenthal, S. M.: Experimental chemotherapy of burns and shock. I, II, and III. Pub. Health Rep., **57**: 1923 (1942); **58**: 513 (1943).

(*9*) Rosenthal, S. M.: Experimental chemotherapy of burns and shock. IV. and V. Pub. Health Rep., **58**: 1429 (1943).

(*10*) Bliss, C. I.: The calculation of the time-mortality curve. Ann. Applied Biol., **24**: 815 (1937).

(*11*) Moon, V. H.: Shock: its Dynamics, Occurrence and Management. Lea and Febiger, Philadelphia, 1942.

(*12*) Vaughan, J. M.: The transfusion of blood and blood derivatives under emergency conditions. J. Am. Med. Assoc., **123**: 1020 (1943).

(*13*) Levinson, S. O., Neuwelt, F., and Necheles, H.: Human serum as a blood substitute. J. Am. Med. Assoc., **114**: 455 (1940).

(*14*) Fox, C. L., Jr.: Oral sodium lactate in the treatment of burn shock. J. Am. Med. Assoc., **124**: 207 (1944).

(*15*) Zwemer, R. L., and Scudder, J.: Blood potassium during experimental shock. Surgery, **4**: 510 (1938). See also Fenn, W. O., Physiol. Rev., **20**: 377 (1940).

(*16*) Manery, J. F., and Solandt, D.: Studies in experimental traumatic shock with particular reference to plasma potassium changes. Am. J. Physiol., **138**: 499 (1943).

(*17*) Winkler, A. W., and Hoff, H. E.: Potassium and the cause of death in traumatic shock. Am. J. Physiol., **139**: 686 (1943).

(18) Thaler, J. I.: Evidence of permeability of tissue cells to potassium. Proc. Soc. Exp. Biol. & Med., **33**: 368 (1935). Stewart, J. D., and Rourke, G. M.: Intracellular fluid loss in hemorrhage. J. Clin Invest., **15**: 697 (1936).
(19) Buttle, G. A. H., Kekwick, H., and Schweitzer, A.: Blood substitutes in treatment of acute hemorrhage. Lancet, **2**: 507 (1940).
(20) Parkins, W. M., Koop, C. E., Riegel, C., Vars, H. M., and Lockwood, J. S.: Gelatin as a plasma substitute with particular reference to experimental hemorrhage and burn shock. Ann. Surg., **118**: 193 (1943).
(21) Hoitink, A. W. J. H.: Treatment of acute fatal hemorrhage by injection of artificial blood substitutes. Surg., Gyn., & Obst., **61**: 613 (1935).
(22) Allen, F. M.: Theory and therapy of shock. Am. J. Surg., **62**: 80 (1943).

DEATHS DURING WEEK ENDED MAY 6, 1944

[From the Weekly Mortality Index, issued by the Bureau of the Census, Department of Commerce]

	Week ended May 6, 1944	Corresponding week, 1943
Data for 93 large cities of the United States:		
Total deaths	8,922	9,516
Average for 3 prior years	8,722	
Total deaths, first 18 weeks of year	178,684	181,060
Deaths under 1 year of age	630	636
Average for 3 prior years	569	
Deaths under 1 year of age, first 18 weeks of year	11,367	12,578
Data from industrial insurance companies:		
Policies in force	66,457,823	65,513,811
Number of death claims	11,928	12,180
Death claims per 1,000 policies in force, annual rate	9.4	9.7
Death claims per 1,000 policies, first 18 weeks of year, annual rate	11.0	10.5

PREVALENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED MAY 13, 1944

Summary

A total of 420 cases of meningococcus meningitis was reported for the week, as compared with 382 last week, 449 for the next earlier week, 485 for the corresponding week last year, and a 5-year (1939–43) median of 54. Decreases were recorded only in the Middle Atlantic, South Atlantic, and West South Central areas. Nine States reporting more than 15 cases each (last week's figures in parentheses) are as follows: *Increases*—Massachusetts 16 (8), New Jersey 21 (16), Illinois 29 (22), Michigan 28 (13), Missouri 19 (15), California 43 (25); *decreases*—New York 45 (50), Pennsylvania 25 (40), Ohio 28 (31). The total for the year to date is 9,885, as compared with 9,305 for the same period last year and a 5-year median of 941.

Of a total of 37 cases of poliomyelitis reported, as compared with 14 last week and a 5-year median of 22, 10 occurred in California and 4 each in South Carolina and Louisiana. A total of 131 cases has been reported since April 1, as compared with 143 for the same period last year.

Decreases occurred in the incidence of both measles and scarlet fever. Totals reported are 25,812 for measles and 6,162 for scarlet fever, as compared with 26,067 and 6,672, respectively, for last week, and respective 5-year medians of 22,632 and 3,823.

The current incidence of diphtheria, influenza, smallpox, and whooping cough is below that for last week and the corresponding 5-year median. A total of 86 cases of typhoid fever was reported, as compared with 67 last week and a 5-year median of 100. Of the current total, 19 were reported in California and 12 in Texas.

Deaths recorded for the week in 92 large cities of the United States totaled 9,044, as compared with 8,874 last week and a 3-year (1941–43) average of 8,614. The total for the year to date is 186,531, as compared with 189,350 for the same period last year.

Telegraphic morbidity reports from State health officers for the week ended May 13, 1944, and comparison with corresponding week of 1943 and 5-year median

In these tables a zero indicates a definite report, while leaders imply that, although none was reported, cases may have occurred.

Division and State	Diphtheria			Influenza			Measles			Meningitis, meningococcus		
	Week ended— May 13, 1944	Week ended— May 15, 1943	Median 1939–43	Week ended— May 13, 1944	Week ended— May 15, 1943	Median 1939–43	Week ended— May 13, 1944	Week ended— May 15, 1943	Median 1939–43	Week ended— May 13, 1944	Week ended— May 15, 1943	Median 1939–43
NEW ENGLAND												
Maine	1	0	0	1	------	1	229	34	127	1	2	1
New Hampshire	0	0	0	------	------	------	5	42	38	2	4	0
Vermont	1	0	0	------	------	------	66	251	142	0	0	0
Massachusetts	2	0	4	------	------	------	971	1,669	1,048	16	30	5
Rhode Island	0	2	1	18	1	------	54	52	93	1	12	0
Connecticut	1	0	0	1	3	2	600	491	422	5	4	0
MIDDLE ATLANTIC												
New York	9	16	20	[1] 5	[1] 10	[1] 10	1,555	3,383	2,320	45	70	7
New Jersey	7	4	4	5	10	5	1,192	2,329	759	21	42	1
Pennsylvania [2]	10	5	13	1	3	------	937	2,096	1,329	25	34	4
EAST NORTH CENTRAL												
Ohio	5	19	10	9	8	8	433	519	497	28	15	1
Indiana	8	6	6	7	------	1	179	490	219	11	7	1
Illinois	3	32	30	16	26	7	695	1,870	445	29	14	2
Michigan [3]	3	3	4	2	2	7	902	3,782	661	28	24	1
Wisconsin	13	1	1	34	28	30	2,687	2,320	1,401	13	8	0
WEST NORTH CENTRAL												
Minnesota	0	0	2	------	------	------	605	379	293	3	3	0
Iowa	3	2	2	1	1	1	223	183	246	1	1	0
Missouri	4	2	2	2	2	2	226	494	251	19	33	2
North Dakota	1	1	1	------	25	9	87	139	21	3	1	0
South Dakota	0	0	1	------	------	1	19	63	63	1	0	0
Nebraska	1	0	1	2	22	4	80	173	173	2	0	0
Kansas	3	0	5	1	------	4	465	542	542	5	7	0
SOUTH ATLANTIC												
Delaware	1	0	0	------	------	------	13	117	9	1	2	0
Maryland [3]	6	1	1	11	8	3	464	263	263	13	13	5
District of Columbia	0	0	1	2	------	------	194	123	123	3	2	0
Virginia	3	2	5	93	141	141	849	326	326	12	19	4
West Virginia	5	2	4	11	1	10	313	159	88	2	9	1
North Carolina	8	6	5	4	8	6	878	280	856	6	18	2
South Carolina	1	15	4	184	39	213	388	127	100	0	1	1
Georgia	3	2	3	10	35	46	59	175	175	6	2	0
Florida	3	3	1	27	12	11	295	136	166	2	9	0
EAST SOUTH CENTRAL												
Kentucky	3	5	5	1	20	8	113	167	120	7	21	3
Tennessee	2	1	2	29	63	42	92	376	181	14	9	2
Alabama	4	2	4	24	47	47	238	205	149	9	8	0
Mississippi [3]	8	1	5	------	------	------	------	------	------	10	8	2
WEST SOUTH CENTRAL												
Arkansas	2	2	3	35	8	21	161	98	120	4	0	2
Louisiana	4	2	3	1	------	3	81	88	67	2	3	2
Oklahoma	1	6	6	28	44	44	408	91	153	1	0	0
Texas	0	22	22	472	267	335	2,915	432	991	10	15	3
MOUNTAIN												
Montana	2	1	2	------	9	9	118	134	134	4	0	0
Idaho	0	0	0	------	------	------	80	44	44	1	8	0
Wyoming	0	0	0	1	7	1	153	178	80	1	0	0
Colorado	3	7	7	12	25	23	170	583	424	5	3	1
New Mexico	0	0	0	1	8	6	143	23	27	1	0	0
Arizona	7	1	1	25	24	55	118	10	78	0	1	0
Utah [3]	0	0	0	------	34	6	68	252	252	0	1	0
Nevada	0	0	0	------	------	------	------	13	4	0	1	0
PACIFIC												
Washington	1	5	1	------	1	------	236	620	620	4	4	1
Oregon	0	0	0	8	65	12	158	237	237	0	5	0
California	19	8	8	66	65	53	4,947	1,218	1,218	43	17	2
Total	161	187	216	1,150	1,072	1,386	25,812	27,776	22,632	420	485	54
19 weeks	4,345	4,926	5,255	330,757	71,140	143,546	480,447	368,642	351,766	9,885	9,305	941

See footnotes at end of table.

Telegraphic morbidity reports from State health officers for the week ended May 13, 1944, and comparison with corresponding week of 1943 and 5-year median—Con.

Division and State	Poliomyelitis			Scarlet fever			Smallpox			Typhoid and paratyphoid fever [4]		
	Week ended		Median 1939–43	Week ended		Median 1939–43	Week ended		Median 1939–43	Week ended		Median 1939–43
	May 13, 1944	May 15, 1943		May 13, 1944	May 15, 1943		May 13, 1944	May 15, 1943		May 13, 1944	May 15, 1943	
NEW ENGLAND												
Maine	0	0	0	52	9	9	0	0	0	2	0	0
New Hampshire	0	0	0	6	2	5	0	0	0	0	0	0
Vermont	1	0	0	8	9	9	0	0	0	0	0	0
Massachusetts	0	1	0	345	483	191	0	0	0	1	1	1
Rhode Island	1	0	0	7	35	14	0	0	0	0	0	0
Connecticut	0	0	0	83	99	67	0	0	0	0	0	2
MIDDLE ATLANTIC												
New York	0	0	1	504	619	572	0	0	0	8	9	6
New Jersey	0	0	0	276	154	261	0	0	0	1	0	1
Pennsylvania	0	0	0	684	343	402	0	0	0	3	3	5
EAST NORTH CENTRAL												
Ohio	1	2	0	576	125	297	0	15	0	2	1	3
Indiana	0	0	0	169	66	82	0	0	1	4	2	2
Illinois	0	1	1	389	202	340	2	0	2	2	0	2
Michigan [3]	0	0	0	300	134	263	0	1	2	6	1	1
Wisconsin	0	1	1	318	357	131	1	0	1	0	0	2
WEST NORTH CENTRAL												
Minnesota	0	0	0	137	49	49	0	0	1	0	2	1
Iowa	0	0	0	166	56	56	0	6	9	0	0	1
Missouri	0	0	0	161	171	65	0	0	3	2	2	1
North Dakota	0	0	0	58	4	5	0	0	0	0	1	1
South Dakota	0	0	0	16	7	12	0	0	0	0	0	0
Nebraska	0	0	0	34	25	24	0	0	0	0	0	0
Kansas	1	0	0	63	78	54	0	0	0	0	2	2
SOUTH ATLANTIC												
Delaware	0	0	0	7	5	5	0	0	0	0	0	0
Maryland [3]	0	0	0	215	154	51	0	0	0	0	0	1
District of Columbia	0	0	0	119	18	12	0	0	0	0	0	0
Virginia	1	0	0	80	38	30	0	0	0	1	2	2
West Virginia	0	0	0	102	26	26	1	1	0	4	0	1
North Carolina	2	0	0	31	16	16	0	1	0	1	1	2
South Carolina	4	0	1	5	8	3	0	0	0	0	1	2
Georgia	1	0	0	27	15	11	0	0	0	2	5	5
Florida	2	0	2	4	3	4	0	0	0	1	1	4
EAST SOUTH CENTRAL												
Kentucky	1	1	0	91	32	48	0	0	0	0	1	4
Tennessee	0	0	0	63	28	55	0	0	0	3	4	4
Alabama	1	0	0	7	7	8	0	0	0	1	1	1
Mississippi [3]	2	4	1	5	9	1	0	0	0	3	0	3
WEST SOUTH CENTRAL												
Arkansas	0	2	0	7	12	7	0	0	0	0	1	2
Louisiana	4	0	0	3	1	5	0	0	0	8	5	5
Oklahoma	0	0	0	15	16	16	0	0	1	1	0	2
Texas	2	2	1	155	58	37	1	1	1	12	2	7
MOUNTAIN												
Montana	0	0	0	36	8	18	0	0	0	0	0	0
Idaho	0	0	0	59	90	7	0	0	0	1	1	1
Wyoming	0	0	0	16	55	14	0	0	0	0	0	0
Colorado	0	0	0	60	62	34	0	0	0	1	0	1
New Mexico	0	0	0	14	10	6	0	0	0	1	0	0
Arizona	1	3	0	18	9	7	0	0	0	1	1	1
Utah [3]	0	0	0	71	45	20	0	0	0	0	0	0
Nevada	0	0	0	2	2	0	0	0	0	0	0	0
PACIFIC												
Washington	2	0	0	178	31	31	8	0	0	0	0	2
Oregon	0	0	0	115	12	13	0	0	0	0	1	1
California	10	11	3	305	166	143	3	0	0	19	3	4
Total	37	28	22	6,162	3,963	3,823	11	25	33	86	54	100
19 weeks	426	463	436	118,430	75,724	75,724	224	501	856	1,376	1,663	1,507

See footnotes at end of table.

Telegraphic morbidity reports from State health officers for the year ended May 13, 1944, and comparison with corresponding week of 1943 and 5-year median—Con.

Division and State	Whooping cough: Week ended May 13, 1944	Whooping cough: Week ended May 15, 1943	Whooping cough: Median 1939-43	Week ended May 13, 1944: Anthrax	Dysentery: Amebic	Dysentery: Bacillary	Dysentery: Unspecified	Encephalitis, infectious	Leprosy	Rocky Mt. spotted fever	Tularemia	Typhus fever
NEW ENGLAND												
Maine	14	52	30	0	0	0	0	0	0	0	0	0
New Hampshire	1	13	13	0	0	0	0	0	0	0	0	0
Vermont	3	1	31	0	0	0	0	0	0	0	0	0
Massachusetts	88	151	204	0	0	31	0	0	0	0	0	0
Rhode Island	6	16	16	0	0	0	0	0	0	0	0	0
Connecticut	46	48	51	0	0	0	0	0	0	0	0	0
MIDDLE ATLANTIC												
New York	116	260	346	0	0	8	0	0	0	0	0	0
New Jersey	48	135	135	0	0	0	0	0	0	2	0	0
Pennsylvania	83	280	307	0	0	1	0	0	0	0	0	0
EAST NORTH CENTRAL												
Ohio	52	82	218	0	1	0	0	0	0	0	0	0
Indiana	12	83	55	0	0	0	0	0	0	0	0	0
Illinois	13	128	128	0	0	31	0	0	0	0	0	0
Michigan [2]	62	291	199	0	1	1	0	0	0	0	0	0
Wisconsin	38	248	138	0	1	0	0	0	0	0	0	0
WEST NORTH CENTRAL												
Minnesota	11	91	48	0	4	1	0	0	0	0	0	0
Iowa	3	59	26	0	0	0	0	0	0	0	0	0
Missouri	19	50	44	0	0	0	1	0	0	0	0	0
North Dakota	1	12	11	0	0	0	0	0	0	0	0	0
South Dakota	5		0	0	0	0	0	0	0	0	0	0
Nebraska		16	7	0	0	0	0	0	0	0	0	0
Kansas	28	68	42	0	0	0	0	0	0	0	0	0
SOUTH ATLANTIC												
Delaware		2	1	0	0	0	0	0	0	0	0	0
Maryland [3]	50	107	102	0	0	0	2	1	1	0	0	1
District of Columbia	3	38	20	0	0	0	0	0	0	0	0	0
Virginia	65	145	55	0	0	0	17	0	0	0	2	1
West Virginia	16	61	46	0	0	0	0	0	0	0	0	0
North Carolina	97	175	175	0	0	0	0	0	0	1	1	7
South Carolina	83	62	62	0	0	0	0	0	0	0	0	0
Georgia	16	60	56	0	0	3	3	0	0	0	3	10
Florida	51	34	12	0	1	0	2	0	0	0	0	4
EAST SOUTH CENTRAL												
Kentucky	66	13	59	0	0	7	0	0	0	0	0	0
Tennessee	20	78	62	0	0	0	0	0	0	0	0	0
Alabama	48	100	51	0	0	0	0	0	0	0	0	11
Mississippi [2]					0	0	0	0	0	0	6	2
WEST SOUTH CENTRAL												
Arkansas	8	44	21	0	0	6	0	0	0	0	0	0
Louisiana	2	2	10	0	0	0	0	0	0	0	1	0
Oklahoma	16	33	14	0	0	0	0	0	0	0	0	0
Texas	220	494	300	0	5	374	0	1	0	0	2	34
MOUNTAIN												
Montana	1	25	14	0	0	0	0	0	0	1	0	0
Idaho	7	2	10	0	0	0	0	0	0	0	1	0
Wyoming	15	5	5	0	0	0	0	0	0	3	0	0
Colorado	45	21	27	0	0	0	0	0	0	0	1	0
New Mexico	8	18	23	0	0	0	0	0	0	0	0	0
Arizona	10	9	28	0	0	0	59	0	0	0	0	0
Utah [3]	43		50	0	0	0	0	0	0	0	1	0
Nevada	1	3	3	0	0	0	0	0	0	0	0	0
PACIFIC												
Washington	22	35	49	0	0	0	0	0	0	0	0	0
Oregon	13	52	29	0	0	0	0	0	0	0	0	0
California	115	431	431	0	0	4	0	0	0	0	0	0
Total	1,690	4,133	3,820	0	13	467	84	2	1	7	18	70
19 weeks	34,214	76,786	76,445	17	486	4,426	1,304	209	12	22	199	792
19 weeks, 1943				26	560	3,761	873	211	9	56	316	867

Alaska: Chickenpox 26, measles 1, German measles 8, whooping cough 3.

[1] New York City only. [2] Psittacosis: Pennsylvania, 1 case. [3] Period ended earlier than Saturday.

[4] Including paratyphoid fever cases reported separately as follows: Massachusetts 1, New York 1, Georgia 1, Florida 1, Louisiana 1 (week ended May 6: Massachusetts 2, Connecticut 1, Virginia 1, South Carolina 2, Florida 2, Tennessee 1, California1).

WEEKLY REPORTS FROM CITIES

City reports for week ended April 29, 1944

This table lists the reports from 86 cities of more than 10,000 population distributed throughout the United States, and represents a cross section of the current urban incidence of the diseases included in the table.

	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
NEW ENGLAND												
New Hampshire:												
Concord	0	0		0	3	0	1	0	2	0	0	0
Vermont:												
Barre	0	0		0	2	0	0	0	0	0	0	0
Massachusetts:												
Boston	0	0		1	203	4	23	0	62	0	0	12
Fall River	1	0		0	49	0	1	0	3	0	0	0
Springfield	0	0		0	39	0	0	0	37	0	0	5
Worcester	0	0		0	7	0	7	0	50	0	0	7
Rhode Island:												
Providence	1	0		0	80	1	2	0	7	0	0	8
Connecticut:												
Bridgeport	0	0		0	34	0	0	0	5	0	0	0
Hartford	0	0		1	9	0	2	0	28	0	0	0
New Haven	0	0	1	0	98	1	3	0	4	0	0	4
MIDDLE ATLANTIC												
New York:												
Buffalo	0	0		0	3	1	7	0	18	0	0	0
New York	9	1	3	1	1,005	36	78	0	322	0	2	24
Rochester	0	0		1	9	3	6	0	5	0	0	1
Syracuse	0	0		1	12	1	1	0	9	0	1	3
New Jersey:												
Camden	0	0		1	0	1	4	0	38	0	0	0
Newark	0	0	1	0	265	3	4	0	30	0	0	4
Trenton	0	0		0	7	0	3	0	13	0	0	0
Pennsylvania:												
Philadelphia	0	0	2	2	67	10	22	0	112	0	0	13
Pittsburgh	0	0		0	19	4	15	0	21	0	0	6
Reading	0	0		1	5	0	1	0	3	0	0	0
EAST NORTH CENTRAL												
Ohio:												
Cincinnati	1	0		1	35	10	6	0	65	0	0	2
Cleveland	2	0	6	1	65	9	9	0	121	0	0	11
Columbus	0	0		0	72	0	4	0	7	0	0	12
Indiana:												
Fort Wayne	0	0		0	0	0	3	0	5	0	1	0
Indianapolis	1	0		0	85	1	3	0	52	0	0	9
South Bend	0	0		0	1	0	0	0	6	0	0	0
Terre Haute	0	0		1	1	0	2	0	3	0	0	1
Illinois:												
Chicago	2	0	3	2	137	20	29	1	163	0	0	5
Springfield	0	0		0	39	0	5	0	9	0	0	1
Michigan:												
Detroit	4	0	2	1	128	8	21	0	146	0	2	21
Flint	0	0		0	3	0	3	0	3	0	0	0
Grand Rapids	0	0		0	21	1	1	0	5	0	0	0
Wisconsin:												
Kenosha	0	0		0	219	0	0	0	0	0	0	1
Milwaukee	0	1		0	156	4	6	0	61	0	0	17
Racine	0	0		0	41	0	1	0	7	0	0	3
Superior	0	0		0	5	0	0	0	22	0	0	0
WEST NORTH CENTRAL												
Minnesota:												
Duluth	0	0		0	119	1	2	0	11	0	0	0
Minneapolis	0	0		0	205	0	5	0	32	0	0	5
St. Paul	1	0		0	244	0	4	0	34	0	0	7
Missouri:												
Kansas City	0	0		0	96	2	3	0	38	0	0	4
St. Joseph	0	0		0	2	0	0	0	6	0	0	0
St. Louis	0	0	1	0	89	17	10	0	56	0	1	0
Nebraska:												
Omaha	0	0		0	96	0	3	0	25	0	0	4
Kansas:												
Topeka	0	0		0	70	0	2	0	1	0	1	3
Wichita	0	0	1	0	36	1	5	0	7	0	0	1

City reports for week ended April 29, 1944—Continued

	Diphtheria cases	Encephalitis, infectious, cases	Influenza Cases	Influenza Deaths	Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
SOUTH ATLANTIC												
Delaware:												
Wilmington	0	0		0	0	3	1	0	1	0	0	0
Maryland:												
Baltimore	19	0	3	3	404	5	15	0	115	0	2	17
Cumberland	0	0		0	2	0	0	0	0	0	0	0
Frederick	0	0		0	0	0	0	0	4	0	0	0
District of Columbia:												
Washington	0	0	2	0	229	4	6	0	191	0	0	5
Virginia:												
Lynchburg	0	0		0	2	0	1	0	6	0	0	0
Richmond	0	0	2	1	61	0	2	5	0	0	0	1
Roanoke	0	0		0	14	0	1	0	0	0	0	9
West Virginia:												
Wheeling	0	0		0	21	1	1	0	10	0	0	0
North Carolina:												
Wilmington	0	0		1	38	0	1	0	0	0	0	5
Winston-Salem	0	0		0	32	0	0	0	5	0	1	0
South Carolina:												
Charleston	0	0		0	29	0	2	0	0	0	0	0
Georgia:												
Atlanta	0	0		0	5	3	1	0	16	0	0	0
Brunswick	0	0		0	1	0	0	0	0	0	0	0
Savannah	0	0		0	0	0	1	0	0	0	0	0
Florida:												
Tampa	2	0	6	0	3	1	2	0	2	0	0	1
EAST SOUTH CENTRAL												
Tennessee:												
Memphis	0	0	1	1	31	7	1	0	58	0	0	8
Nashville	0	0		0	13	0	1	0	8	0	0	0
Alabama:												
Birmingham	0	0	3	1	21	0	1	0	6	0	0	1
Mobile	0	0		1	1	1	1	0	0	0	0	0
WEST SOUTH CENTRAL												
Arkansas:												
Little Rock	0	0		0	21	1	2	0	0	0	0	1
Louisiana:												
New Orleans	1	0	3	1	33	3	5	2	6	0	0	0
Shreveport	0	0		0	0	1	8	0	0	0	1	0
Texas:												
Dallas	3	0		0	213	3	2	0	7	0	0	2
Galveston	0	0		0	3	0	1	0	0	0	0	0
Houston	1	0		1	14	1	5	0	2	0	0	0
San Antonio	1	0		0	21	2	4	0	2	0	0	0
MOUNTAIN												
Montana:												
Billings	0	0		0	11	0	0	0	1	0	0	0
Great Falls	0	0		0	5	1	1	0	3	0	0	0
Helena	0	0		0	5	0	0	0	0	0	0	0
Missoula	0	0		0	19	0	1	0	2	0	0	0
Idaho:												
Boise	0	0		0	2	0	0	0	1	0	0	0
Colorado:												
Denver	2	0	1	1	99	0	3	0	21	0	1	2
Pueblo	0	0		0	13	0	1	0	1	0	0	1
Utah:												
Salt Lake City	0	0		0	17	0	0	0	29	0	0	3
PACIFIC												
Washington:												
Seattle	0	0		1	45	1	6	0	54	0	0	1
Spokane	0	0		0	10	1	2	0	16	0	0	1
Tacoma	0	0		0	17	0	1	0	35	0	0	0

City reports for week ended April 29, 1944—Continued

	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
California:												
Los Angeles	4	0	5	1	463	6	10	0	27	0	0	10
Sacramento	1	0	------	0	26	0	2	0	4	0	0	2
San Francisco	0	0	2	1	130	3	6	1	48	0	0	11
Total	56	2	48	29	5,955	187	400	9	2,337	0	13	275
Corresponding week, 1943	68	------	84	0	9,438	------	470	------	1,514	1	0	1,149
Average, 1943	67	------	108	[1] 25	[2] 6,122	------	[1] 376	------	1,526	4	16	1,190

[1] 3-year average.
[2] 5-year median.
Dysentery, amebic.—Cleveland 1, St. Louis 1, Birmingham 1.
Dysentery, bacillary.—New York 2, Detroit 1, Charleston, S. C., 10, Atlanta 1, Los Angeles 3.
Dysentery, unspecified.—Baltimore 1, San Antonio 7.
Typhus fever, endemic.—Richmond 1, Wilmington, N. C., 3, Charleston, S. C., 1, Savannah 3, Tampa 1, Mobile 3, New Orleans 1, Houston 1, San Antonio 2.

Rates (annual basis) per 100,000 population, by geographic groups, for the 86 cities in the preceding table (estimated population, 1942, 34,546,900)

	Diphtheria case rates	Encephalitis, infectious, case rates	Influenza		Measles case rates	Meningitis, meningococcus, case rates	Pneumonia death rates	Poliomyelitis case rates	Scarlet fever case rates	Smallpox case rates	Typhoid and paratyphoid fever case rates	Whooping cough case rates
			Case rates	Death rates								
New England	5.2	0.0	2.6	5.2	1,355	15.5	100.8	0.0	512	0.0	0.0	93
Middle Atlantic	4.0	0.4	2.7	3.1	623	26.4	63.1	0.0	256	0.0	1.3	23
East North Central	5.9	0.6	6.4	3.5	590	31.0	54.5	0.6	395	0.0	1.8	49
West North Central	2.0	0.0	4.0	0.0	1,898	41.6	67.4	0.0	416	0.0	4.0	48
South Atlantic	36.9	0.0	22.8	8.8	1,476	29.8	59.7	8.8	614	0.0	5.3	67
East South Central	0.0	0.0	23.8	17.9	393	47.6	23.8	0.0	429	0.0	0.0	54
West South Central	17.6	0.0	8.8	5.9	897	82.4	64.7	5.9	50	0.0	2.9	9
Mountain	16.1	0.0	8.1	8.0	1,378	8.0	48.4	0.0	468	0.0	8.1	48
Pacific	8.8	0.0	12.3	5.2	1,211	19.3	47.3	3.3	322	0.0	0.0	44
Total	8.5	0.3	7.3	4.4	901	28.3	60.5	1.4	353	0.0	2.0	42

TERRITORIES AND POSSESSIONS

Hawaii Territory

Plague (rodent).—Rodents found in Paauhau area, Hamakua District, Island of Hawaii, T. H., have been proved positive for plague as follows: April 10, 1 mouse; April 13, 1 rat; April 14, 1 rat.

Panama Canal Zone

Notifiable diseases—March 1944.—During the month of March 1944, certain notifiable diseases were reported in the Panama Canal Zone and terminal cities as follows:

Disease	Panama		Colon		Canal Zone		Outside the Zone and terminal cities		Total	
	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths
Chickenpox	8		7		6		2		23	
Diphtheria	7						1		8	
Dysentery (amebic)							2	1	2	
Dysentery (bacillary)			1		2				3	
German measles	3				13				16	
Leprosy							1	1	1	1
Malaria [1]	10		4		66		46	5	126	5
Meningitis, meningococcus	1	1							1	1
Mumps	8		3		19		6		36	
Paratyphoid fever	2						2		4	
Pneumonia		11		5	31	1		4	[2] 31	21
Tuberculosis		22		6	5	1		4	[2] 5	33
Typhoid fever							2	1	2	1
Typhus fever							1		1	
Whooping cough					2				[2] 2	

[1] 47 recurrent cases.
[2] Reported in the Canal Zone only.

Virgin Islands of the United States

Notifiable diseases—January–March 1944.—During the months of January, February, and March 1944, cases of certain notifiable diseases were reported in the Virgin Islands as follows:

Disease	January	February	March	Disease	January	February	March
Chickenpox		1	4	Mumps			1
Filariasis	9	6	11	Pellagra			1
Gonorrhea	16	8	12	Schistosomiasis		1	
Hookworm disease	4	6	2	Syphilis	15	20	12
Lymphogranuloma inguinale		1		Tuberculosis	5	1	2
Malaria	2	1		Typhoid fever		1	
				Typhus fever	1		

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—Week ended April 15, 1944.—During the week ended April 15, 1944, cases of certain communicable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox		40	7	148	201	40	16	58	80	590
Diphtheria	2	5	2	40	3	1	1		1	55
Dysentery				5						5
German measles		21		93	66	10	44	24	24	282
Influenza	1	14	1		32	4	1		21	74
Measles		60	11	1,020	588	264	55	157	28	2,183
Meningitis, meningococcus				3	3				4	10
Mumps	1	9	1	181	154	67	14	47	42	516
Poliomyelitis								2		2
Scarlet fever		13	8	63	230	88	7	99	90	598
Tuberculosis (all forms)		6	1	325	40	11	11	12	20	426
Typhoid and paratyphoid fever				28	2			30	1	61
Undulant fever				1	2				2	5
Whooping cough		25		52	40	4	11	17	7	156

CUBA

Provinces—Notifiable diseases—4 weeks ended April 22, 1944.—During the 4 weeks ended April 22, 1944, cases of certain notifiable diseases were reported in the Provinces of Cuba as follows:

Disease	Pinar del Rio	Habana [1]	Matanzas	Santa Clara	Camaguey	Oriente	Total
Cancer	2	1	6	4		10	23
Chickenpox		11				3	14
Diphtheria	1	21	3	2		2	29
Leprosy						1	1
Malaria	13	4	9	9	5	249	289
Measles	4	28	15			2	49
Poliomyelitis			1			2	3
Scarlet fever		2			1	1	4
Tetanus, infantile			1				1
Tuberculosis	18	14	28	44	15	47	166
Typhoid fever	12	59	3	20	18	35	147
Yaws						1	1

[1] Includes the city of Habana.

FINLAND

Notifiable diseases—February 1944.—During the month of February 1944, cases of certain notifiable diseases were reported in Finland as follows:

Disease	Cases	Disease	Cases
Cerebrospinal meningitis	20	Paratyphoid fever	96
Chickenpox	521	Pneumonia	2,834
Conjunctivitis	23	Poliomyelitis	8
Diphtheria	1,453	Puerperal fever	34
Dysentery	6	Rheumatic fever	244
Gastroenteritis	1,428	Scabies	2,335
Gonorrhea	505	Scarlet fever	953
Hepatitis, epidemic	520	Syphilis	390
Influenza	3,854	Typhoid fever	34
Laryngitis	58	Vincent's angina	6
Measles	6,522	Whooping cough	764
Mumps	340		

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

NOTE.—Except in cases of unusual incidence, only those places are included which had not previously reported any of the above-mentioned diseases, except yellow fever, during the current year. All reports of yellow fever are published currently.

A table showing the accumulated figures for these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.

(Few reports are available from the invaded countries of Europe and other nations in war zones.)

Plague

Egypt.—Plague has been reported in Egypt as follows: Port Said, week ended April 29, 1944, 2 cases, 1 death; Suez, week ended April 15, 1944, 7 cases, 5 deaths.

India—Calcutta.—For the week ended April 15, 1944, 2 cases of plague with 1 death were reported in Calcutta, India.

Smallpox

India.—Smallpox has been reported in India as follows: Bombay, week ended April 8, 1944, 227 cases, 53 deaths; Calcutta, week ended April 22, 1944, 340 deaths.

Typhus Fever

Guatemala.—For the month of March 1944, 280 cases of typhus fever with 43 deaths were reported in Guatemala. The Departments reporting the highest incidence of this disease are as follows: El Quiche, 36 cases; Guatemala, 90 cases, 16 deaths: Huehuetenango 26 cases, 7 deaths; Quezaltenango, 42 cases, 7 deaths; San Marcos 26 cases, 7 deaths.

Hungary.—For the week ended April 8, 1944, 80 cases of typhus fever were reported in Hungary.

Iraq.—Typhus fever has been reported in Iraq as follows: week ended March 18, 1944, 26 cases, 2 deaths; March 25, 1944, 49 cases 3 deaths.

×

FEDERAL SECURITY AGENCY

UNITED STATES PUBLIC HEALTH SERVICE

THOMAS PARRAN, *Surgeon General*

DIVISION OF PUBLIC HEALTH METHODS

G. ST. J. PERROTT, *Chief of Division*

The PUBLIC HEALTH REPORTS, first published in 1878 under authority of an act of Congress of April 29 of that year, is issued weekly by the United States Public Health Service through the Division of Public Health Methods, pursuant to the following authority of law: United States Code, title 42, sections 7, 30, 93; title 44, section 220.

It contains (1) current information regarding the prevalence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

The PUBLIC HEALTH REPORTS is published primarily for distribution, in accordance with the law, to health officers, members of boards or departments of health, and other persons directly or indirectly engaged in public health work. Articles of special interest are issued as reprints or as supplements, in which forms they are made available for more economical and general distribution.

Requests for and communications regarding the PUBLIC HEALTH REPORTS, reprints, or supplements should be addressed to the Surgeon General, United States Public Health Service, Washington, D. C. Subscribers should remit direct to the Superintendent of Documents, Washington, D. C.

Librarians and others should preserve their copies for binding, as the Public Health Service is unable to supply the general demand for bound copies. Indexes will be supplied upon request.

UNITED STATES GOVERNMENT PRINTING OFFICE, WASHINGTON · 1944

For sale by the Superintendent of Documents, Washington, D. C.

Price 5 cents. Subscription price $2.50 a year

Public Health Reports

VOLUME 59 MAY 26, 1944 NUMBER 21

IN THIS ISSUE

Epidemiological Considerations of Trichinosis Survey

List of Publications of the Public Health Service

Announcement of Fellowships in Health Education

U.S. PUBLIC HEALTH SERVICE · 1798 ·

CONTENTS

Public Health Reports

Vol. 59 • MAY 26, 1944 • *No. 21*

STUDIES ON TRICHINOSIS

XVI. EPIDEMIOLOGICAL CONSIDERATIONS BASED ON THE EXAMINATION FOR TRICHINAE OF 5,313 DIAPHRAGMS FROM 189 HOSPITALS IN 37 STATES AND THE DISTRICT OF COLUMBIA [1 2]

By WILLARD H. WRIGHT, *Professor of Zoology*, LEON JACOBS, *Assistant Protozoologist*, and ARTHUR C. WALTON,[3] *Junior Zoologist, United States Public Health Service*

In a preceding paper in this series, Wright, Kerr, and Jacobs (*1*) have reported the findings of trichinae in the examination of diaphragm material from 5,313 individuals coming to necropsy in various parts of the United States. Of these individuals, 855, or 16.1 percent, were positive for this parasite. The material was divided into various series including 3,000 cases from hospitals in Washington, D. C., and 5 eastern seaboard cities, 200 cases from States in which clinical trichinosis had never been reported, 283 cases involving sudden death without hospitalization or with hospitalization for less than 24 hours, 1,125 cases selected at random from hospitals chosen on a chance basis, 295 cases in which the individuals resided on farms or in villages, 200 cases representing material from orthodox and unorthodox Jews, 200 cases from the State of Washington, and 10 cases from the State of Oregon. It is the purpose of this paper to review the epidemiological considerations and to discuss certain implications which may be derived from the data.

INCIDENCE IN VARIOUS POPULATION GROUPS

Previous papers (*2, 3*) in this series have presented data concerning the incidence of the trichina parasite in individuals comprising certain population groups, with the view of determining whether the habits or mode of life of any particular class of persons might be more conducive to exposure to trichinosis. For the sake of uniformity, this arrangement has been continued and the data are presented in table 1.

[1] A list of the preceding papers in this series is given under "References."
[2] From the Division of Zoology, National Institute of Health.
[3] Resigned September 15, 1941.

TABLE 1.—*Incidence of* Trichinella spiralis *in various population groups as found in 5,313 post-mortem examinations*

	Total number in group	Number infected	Percent infected
Males	3,736	623	16.7
White	2,757	465	16.9
Colored	915	152	16.6
North American Indians	8	1	
Chinese	9	0	
Japanese	4	1	
Filipinos	10	0	
Mexican	25	3	
Race unknown	8	1	
Females	1,575	232	14.7
White	942	140	14.9
Colored	608	86	14.1
North American Indians	8	0	
Japanese	1	0	
Mexican	10	4	
Race unknown	6	2	
Sex unknown	2	0	
Whites	3,699	605	16.4
Negroes	1,523	238	15.6
Other races	75	9	
Race unknown	16	3	
Military (Army-Navy)	[1] 324	41	12.7
Officers (commissioned and warrant)	117	19	16.2
Enlisted men	[1] 207	22	10.6
Army	[2] 203	27	13.3
Navy	[2] 121	14	11.6
Families and relatives of military men	64	11	
Civil	4,964	813	16.3
Civilian Conservation Corps	[3] 54	5	
Farmers	289	48	16.6
Villagers	147	16	10.9
Veterans, mostly World War	[3] 765	157	20.5
Military-Civil status unknown	5	1	
Sea (Navy-Merchant Marine)	300	36	12.0
Merchant Marine	179	22	12.3
Land	5,013	819	16.3
Mentally deranged under hospitalization	684	115	16.8
Mentally sound or not under hospitalization	4,629	740	16.0
High economic-social status	1,189	179	15.1
Low economic-social status	3,788	630	16.6
Economic-social status unknown	336	46	13.7
Total cases	5,313	855	16.1

[1] One case, both soldier and sailor, counted only once.
[2] One case, both soldier and sailor, counted in both groups.
[3] Two cases, both CCC and veteran, counted in both groups.

It will be noted that many of the groupings are predicated on a more or less artificial basis and that many duplications and overlappings are represented. For instance, a single individual might be, and probably in some cases is, included in four or five categories. Thus, a white merchant seaman with a low social-economic status may have been a war veteran and may have been hospitalized for a mental disorder. It is conceivable that one or more of these factors might have had some bearing on his exposure to infection and at the outset of these investigations such was considered probable.

However, in spite of prior conceptions and discussions in previous papers in this series, it will be seen from table 1 that there is a striking uniformity in the incidence of infection encountered in these composite groups. In fact, there appear to be no significant differences between the incidence rates in the various population groups enumerated in

table 1 and the rate obtained for the cases as a whole. In one group the incidence rate is conditioned somewhat by the average age of the individuals included. The veterans group, consisting mostly of World War veterans, has an incidence figure of 20.5 percent, which is considerably above the incidence for the series as a whole. However, the average age of these individuals would probably fall within the age group 45 to 54, which has, according to table 3, an incidence for all series of 18.1 percent. There is no valid statistical difference between the incidence of infection in individuals in this age group and the incidence in the group of veterans.

The military group, consisting of commissioned officers, warrant officers, and enlisted men of the Army and Navy, has an incidence of 12.7 percent. This incidence is not statistically different from that obtained for the survey as a whole. Among commissioned and warrant officers in this group, there was an incidence of 16.2 percent and in the group of enlisted men an incidence of 10.6 percent. In discussing a somewhat wider discrepancy in the incidence in these two groups on the basis of 1,000 examinations in the base series, Hall (*3*) sought an explanation in the fact that the average age of enlisted men in the peacetime Army and Navy was considerably below that for the commissioned and warrant officers. However, there is a certain amount of error in this type of reasoning since actually our sampling included many enlisted men with long periods of service in the military establishment and many who had retired after even longer periods of service.

In order to establish what effect, if any, the age of enlisted men had on the incidence of infection in the military group, we have broken down our data in regard to these two factors. Enlisted men of the Army and Navy between the ages of 15 and 44 comprised 42.6 percent of the total number of such individuals, whereas for our survey as a whole persons between these ages comprised 33 percent of the whole number. Statistically, there is no difference between the incidence rate in these two groups, and likewise no statistical difference between the infection rate in persons over 44 years of age in these two groups. Therefore, the age of the enlisted men had no influence on the incidence rate recorded for the group and the fact that this rate was somewhat lower than the infection rate in the officer group is due merely to chance. The individuals represented in the military group were from the peacetime military establishment since the part of the survey in which military men are represented was completed long before the passage of the Selective Service Act and the outbreak of hostilities.

The group of those having occupations at sea has an incidence figure of 12.0 percent, with an infection rate of 11.6 percent for the Navy and 12.3 percent for the merchant marine. The incidence for

the latter is not statistically different from that shown by the series as a whole. The figures for the Navy and for the combined groups are on the border line of statistical significance and constitute a slightly lower incidence than for the series as a whole. However, this statistical difference is very slight and would probably be dissipated were the number of cases increased.

The incidence of 10.9 percent in the group of villagers is considerably below the general incidence figure and is on the border line of statistical significance. However, since the incidence of infection in the farm group is no different from that in the urban group, there is no good reason to believe that exposure to infection in persons residing in villages of 1,000 population or less would be any different from that faced by persons in the other two groups. Probably with a larger number represented, the figure in this group would not differ from that encountered for our entire sample.

At the present time, it appears that there is no correlation between trichina infection and representation in the various population groups cited. The number of persons in some of the groups in table 1 is not sufficiently large to offer valid appraisal of the question and definite conclusions cannot be drawn until more data become available.

OCCUPATION GROUPS

The occupations represented in our 5,313 cases included nearly all those encountered in civil life. There is no evidence to indicate that occupation in itself has any influence on the incidence of trichina infection. Certain occupations which theoretically might provide increased exposure to trichinosis include those of butcher, cook, and domestic. Among the 5,313 cases there were represented 19 butchers, of whom 4 were infected, and 56 cooks, of whom 13 were infected. There was an infection rate of 15.5 percent in the 400 domestics, a group which included waiters, butlers, and restaurant help. The incidence of trichinae in the domestics does not differ statistically from the incidence figure for the 5,313 cases as a whole. The number of cooks and butchers is too small to warrant definite conclusions. However, it does not appear that butchers, cooks, or domestics are more frequently infected with trichinae than are individuals having other occupations.

INCIDENCE IN MENTALLY DERANGED INDIVIDUALS IN INSTITUTIONS

As noted in table 1, 684, or 12.9 percent, of our 5,313 cases comprised individuals who came to necropsy in mental institutions. This grossly overloads our sample since in 1938, the median year of our survey, there were in mental institutions in the United States 513,858 individuals, or 0.4 percent of the estimated total population. The

incidence of trichina infection in the mentally deranged persons in institutions in our series was 16.8 percent, a figure not statistically different from the incidence figure of 16 percent in 4,629 persons not confined to mental hospitals.

A total of 581 of the 684 institutionalized mentally unsound cases were hospitalized in St. Elizabeths Hospital, Washington, D. C. In the paper reporting the results of the examination of 1,000 diaphragms in our base series, Nolan and Bozicevich (*6*) interpreted data based on examinations of material from this hospital to indicate that prolonged hospitalization results in decreasing exposure to trichinosis since the incidence of infection in the 205 cases examined decreased in accordance with the length of stay of the individual in the hospital. While we do not have data on the length of hospitalization of all of the 684 mentally unsound cases in our series, we do have the information for the 581 cases at St. Elizabeths and have reexamined the question in the light of the findings in these cases. These findings are summarized as follows:

Length of hospitalization	Less than 1 year	1 to 5 years	Over 5 years
Total number of cases examined	180	177	224
Percentage positive for trichinae	16 7	16.9	13.4

On the basis of the larger number of cases, it is evident therefore that there was no correlation between incidence of infection and length of hospitalization in this particular group of individuals. While a slightly lower incidence occurred in the group hospitalized for over 5 years, the difference was not sufficient to be statistically significant.

The question in point can be examined further, however, by reviewing the data concerning the state of the larvae in these positive cases and comparing the findings with the length of hospitalization. The data are summarized as follows:

Length of hospitalization	Less than 1 year	1 to 5 years	Over 5 years	Total
Infections with live larvae	11	10	5	26
Infections with mixed live and dead larvae	2	7	3	12
Infections with dead larvae	17	13	22	52
Total	30	30	30	90

The number of infections with dead larvae predominated over the number with live larvae and with mixed live and dead larvae in the same manner as in the total positive cases in the series as a whole (table 3). Live larvae were encountered in the group of cases with hospitalization for over 5 years, indicating either that these larvae survived for this period of time or that there was exposure to

infection after the commitment of the patients to the hospital; whether one or both of these possibilities existed, we are not prepared to say, although it appears probable that larvae are capable of surviving for this period of time if not longer.

There is a close correlation between the findings as regards the state of the larvae and the average length of hospitalization of individuals in the three categories. The individuals with live larvae were hospitalized for an average of 2 years and 10 months; those with mixed live and dead larvae for an average of 4 years and 9 months; and those with dead larvae for an average of 9 years and 7 months. These data would seem to add evidence to the view that most, if not all, of the trichina infections were acquired before the admission of the patients to the hospital in question.

The average age at death of the patients in the three groups is of interest in connection with the state of the larvae. The average for those patients having live larvae was 53.5 years; the average for those with mixed live and dead larvae was 55.3 years; and the average for those with dead larvae was 67.7 years. It is pointed out later that there is a distinct correlation between the age at death and the state of the larvae and this is true for the cases at St. Elizabeths, even though there is no great difference in the average age of death in two of the three groups.

It may be concluded on the basis of the data obtained from an examination of this group of mentally hospitalized individuals that, while there was no statistically significant difference in the rate of trichina infection in patients hospitalized for less than 1 year, from 1 to 5 years, and over 5 years, other evidence indicates that the majority, if not all, of the infections were acquired prior to the entry of the patient into the hospital. Even though exposure may have ceased at this time, these individuals showed an incidence of infection no different from that encountered in individuals not confined to mental institutions. This circumstance is probably associated with the fact that the average age of patients on admission was probably around that of middle life, by which time such individuals would have had adequate opportunities for exposure to trichinosis.

RACE AND NATIONALITY

Data are available concerning the nationalities and racial stocks involved in the 5,313 cases. In some cases, the individuals were citizens of foreign countries. In other cases the name of the individual has been used as a guide in sorting nationalities. Naturally, such a selection is open to considerable error since names may be highly misleading and especially so in the case of married women. Furthermore, in regard to opportunities for exposure to trichinosis, the habits of individuals of foreign extraction tend to change in accordance with

the period of time during which such individuals have resided in the United States. Second or third generation offspring of immigrants may have entirely adopted the American mode of living together with American food habits. However, for purposes of comparison, nationalities and racial groups represented in the 5,313 cases have been separated with the results indicated in table 2.

TABLE 2.—*Incidence of* Trichinella spiralis *by race or nationality*

Race or nationality	Number of diaphragms examined	Number of diaphragms positive	Percent diaphragms positive	Race or nationality	Number of diaphragms examined	Number of diaphragms positive	Percent diaphragms positive
Armenian	8	0		Portuguese	4	1	
Austrian	12	2		Puerto Rican	1	1	
Belgian	1	1		Russian	17	2	
Canadian	8	1		Slavic	37	5	
Chinese	9	0		Spanish	15	3	
Cuban	1	0		Swedish	45	10	
Danish	3	0		Swiss	1	1	
Dutch	3	0		Syrian	4	3	
East Indian	1	0		Turkish	3	1	
English citizens	23	2					
Esthonian	1	0		Total foreign or foreign descent	769	181	23.5
Filipino	10	0					
Finnish	14	1					
French	38	7		North American Indians	16	1	
German	279	79	28.3	Hebrews	235	5	2.1
Greek	16	8		Race or nationality unknown	74	11	
Hungarian	8	3					
Italian	101	30	29.7				
Japanese	5	1		American Negroes and whites of English-Scotch-Irish descent	4,219	657	15.6
Latvian	1	0					
Lithuanian	8	1					
Mexican	35	7					
Norwegian	28	5					
Polish	34	6		Total cases	5,313	855	16.1

There were represented in the survey 4,219 American Negroes and whites of English-Scotch-Irish descent, of whom 657, or 15.6 percent, were infected with trichinae. The 5,313 cases included 16 North American Indians, 74 individuals whose nationality or race was unknown, and 235 Hebrews. The remaining individuals total 769, representing citizens of foreign countries or persons whose names definitely indicated that they were of nationalities or races other than those mentioned above. Of these 769 individuals, 181, or 23.5 percent, were infected with trichinae. These cases included 279 Germans, of whom 79, or 28.3 percent, were infected, and 101 Italians, of whom 30, or 29.7 percent, were infected. The combined German and Italian groups totaled 380, of whom 109, or 28.7 percent, were infected. If we omit from the group of foreign born and foreign descent the 380 individuals in the German and Italian groups, there are 389 other individuals in the group, of whom 72, or 18.5 percent, were infected with trichinae. This incidence is not significantly different than the infection rate of 16.1 percent for the 5,313 individuals as a whole.

Thus it would appear that the higher infection rate in foreigners and those of foreign descent is due to the much higher incidence in the Germans and Italians, and the data bear out the prevailing assumption

that the latter groups are more commonly exposed to trichinosis because of their food habits. The Germans and Italians originated and are still very fond of pork products customarily eaten without cooking by the consumer. Such products frequently represent very important sources of trichina infection and it is probable that the relatively high incidence figure obtained in these two groups is correlated at least to some extent with this particular food habit. These facts are of interest in an attempt to appraise exposure to trichinosis in relation to the peculiar food habits of persons in these groups, but it must not be overlooked that the food habits of the remainder of the population are open to question also because of the relatively high incidence of trichina infection in Negroes and in whites of English-Scotch-Irish descent.

As previously stated, the survey included one group comprising 200 orthodox and unorthodox Jews, of whom only one was positive for trichinae (*1*). An additional 35 Jews, of whom 4 were found to have been infected, were represented in the other series in the survey, making a total of 235 persons of this religious faith, of whom 5, or 2.1 percent, were positive for the parasite (table 2). Compared to the incidence of trichinae in other composite groups, this is a very low rate of infection and demonstrates the protection afforded the Jewish people by the religious injunction against the consumption of pork.

INFECTION AND CONDITION OF LARVAE IN RELATION TO AGE AT DEATH

Age at death.—Table 3 presents data concerning the incidence of infection in various age groups and the condition of the larvae encountered in positive cases in these groups. In the individuals under 45 years of age, the incidence of infection was 12.6 percent, while in the individuals 45 years and over the incidence was 18.3 percent. Thus

TABLE 3.—*Incidence and condition of trichinae by age at death in 855 positive cases*

Age at death	Total number cases	Positive cases		Condition of larvae		
		Number	Percent	Live	Mixed	Dead
1–44	1,967	248	12.6	102	65	81
45 and over	3,304	603	18.3	143	77	383
1–4	85	1	1.2	1		
5–9	63	4	6.3		1	3
10–14	65	8	12.3	4	3	1
15–19	122	7	5.7	4	2	1
20–24	195	21	10.8	10	7	4
25–29	228	27	11.8	14	8	5
30–34	251	37	14.7	19	8	10
35–44	958	143	14.9	50	36	57
45–54	1,050	190	18.1	68	35	87
55–64	1,031	186	18.0	40	22	124
65–74	817	156	19.1	27	18	111
75 and over	406	71	17.5	8	2	61
Unknown	42	4	9.5			4
Total	5,313	855	16.1	245	142	468

there was a statistically significant difference in the occurrence of infection in these two groups, which might be expected when it is considered that older individuals have had more opportunities for acquiring an infection.

With some few exceptions there was a progressive increase in the incidence of infection with increase in age. Two of these exceptions fell within the age groups 10 to 14 and 15 to 19, in which the numbers involved were relatively small, and it seems probable that with a larger number of cases in the survey these differences would disappear. The peak of incidence was reached at 19.1 percent in the age group 65 to 74, the incidence in the group of 75 years and over being 17.5 percent. However, in view of the fewer cases involved, this lower calculated incidence in the age group of 75 and over is not significant. It seems probable that with a larger sampling the difference would no longer exist. As a matter of fact, the percentage of cases in the age group of 75 and over is markedly dissimilar to the percentage of this group in the mortality figures for 1938, the median year of our survey. As will be seen from table 4, the individuals of 75 and over represented only 7.6 percent of the total cases, whereas persons in this age group comprised 24.4 percent of the total deaths over 1 year of age [4] in the

TABLE 4.—*Comparison of age distribution of deaths in the United States in 1938 and distribution in survey sample*

Age at death	Percent total deaths	
	United States, 1938	Survey sample
1–4	2.5	1.6
5–9	1.1	1.2
10–14	1.1	1.2
15–19	1.9	2.3
20–24	2.4	3.7
25–29	2.7	4.3
30–34	2.9	4.7
35–44	8.0	18.0
45–54	12.9	19.8
55–64	17.6	19.4
65–74	22.4	15.4
75 and over	24.4	7.6
Unknown	0.08	0.8

United States in 1938. Table 4 also demonstrates further percentage discrepancies in the age at death of those persons dying in 1938 and the age at death in our sample. Between the ages of 1 and 34, the figures for the two groups do not differ widely. However, the majority of deaths in our sampling are concentrated within the age limits 35 to 64, while the majority of deaths occurring in 1938 fall in the groups over 55 years of age. It is evident therefore that our sample is a biased one and that it comprises a greater percentage of

[4] All the diaphragms in this survey came from individuals over 1 year of age.

individuals succumbing earlier in life than is found in the mortality figures for the median year of this survey. This difference in age distribution may be due to the fact that nearly all deaths in our series were institutional deaths, and it is possible that the average age at death in hospitalized individuals is less than the average age at death in nonhospitalized persons. It has not been possible to secure information on this point for the reason that the Bureau of the Census has no data on the age distribution of persons dying in institutions in the year 1938. It would appear, however, that the lower incidence in the age group of 75 years and over may be directly due to the inadequate representation of this group in our sampling.

Condition of larvae.—As will be noted from table 3, 245, or 28.7 percent, of the 855 positive cases represented infections with live larvae; 142, or 16.6 percent, infections with mixed live and dead larvae; and 468, or 54.7 percent, infections with dead larvae. This distribution of the larvae in the various conditions meets the expected distribution since it may be assumed that, if every individual has a uniform opportunity for infection during his or her lifetime, the possibilities are greater for the existence of old trichina infections with dead and calcified larvae in older individuals. On the other hand it may be assumed that live larvae will be encountered in the majority of infected individuals dying before middle life, since the average duration of infection in such individuals will have been shorter. Further, if the transition of live larvae to dead larvae occupies only a relatively short time, mixed infections will be found most frequently in individuals dying in middle life. The possibility that mixed infections represent superinfections has been discussed in the preceding paper of this series (*1*).

In the present series, live larvae were encountered in every age group with the exception of that of 5 to 9. Up to the age of 35, infections with live larvae constituted about one-half of the total infections. After this the proportion of cases with live larvae gradually decreased until in the age group of 75 and over, only 8 of the 71 cases were represented by only live larvae. As might be expected, a higher proportion of mixed infections occurred at middle age in the groups 35 to 54; actually 71, or 50 percent, of the 142 infections with mixed live and dead larvae occurred in these two decades.

Little is known concerning the rapidity with which larvae die and begin to disintegrate or calcify. Certain reports in the literature offer evidence that larvae may be very long lived. For instance, Babes (*4*) has reported the finding of live larvae in an individual who had suffered from clinical trichinosis 21 years previously; and Turner (*5*) noted a case in which live larvae were recovered from an individual 26 years after an attack of trichinosis, the larvae producing an infection in rabbits after the feeding of the infected muscle. Nolan and

Bozicevich (*6*) described a case included in our base series in which living larvae were encountered after the individual had been confined in a mental institution for 19 years and in which exposure to trichinosis was considered to be extremely limited. In all of these cases, however, the possibility of reinfection cannot be ruled out. Dammann (*7*) has offered more conclusive evidence concerning the longevity of trichina larvae in his report of the infection of rabbits with the muscle tissue of a hog which had been infected over 11 years previously and maintained during this time in an environment which excluded reinfection. On the other hand, our finding of dead larvae in 3 of 4 infections in persons in the age group of 5 to 9, and the finding of mixed live and dead larvae in the fourth case in this group, indicate that trichinae are not long lived in all cases and that in some cases death of the larvae may occur within a few years after infection.

SUMMARY AND CONCLUSIONS

The epidemiological evidence obtained from the examination of 5,313 diaphragms from 189 hospitals in 37 States and the District of Columbia has been reviewed. This evidence would indicate that there is no correlation between trichina infection and sex, civil or military status, past military service, occupation, mental hospitalization, urban or rural residence, or social-economic status.

The 5,313 cases included 769 persons of foreign citizenship or whose names indicated foreign extraction, of whom 181, or 23.5 percent, were infected. Individuals in the German and Italian groups totaled 380, of whom 109, or 28.7 percent, were infected. A comparison of these figures with an incidence of 15.6 percent in 4,219 American Negroes and whites of English-Scotch-Irish descent would seem to indicate that persons of foreign extraction are more frequently exposed to trichinosis. However, this applies only to individuals in the German and Italian groups, since the infection rate in other foreigners was not significantly different than that for the group as a whole. Represented were 235 Jews, of whom only 5, or 2.1 percent, were infected.

The peak of incidence of 19.1 percent was reached in the age group 65 to 74, although it appears that the actual peak would have fallen in the group over 75 years of age had that group been represented in our survey to the extent that it is represented in the mortality figures for the year 1938, the median year of the survey.

Of the 855 positive cases, 245, or 28.7 percent, had infections with live larvae; 142, or 16.6 percent, infections with mixed live and dead larvae; and 468, or 54.7 percent, infections with dead larvae. The finding of dead larvae in 3 of 4 cases in the age group 5 to 9 indicates that death of the larvae may occur within a few years after infection.

While there was no statistically significant difference between the

rate of trichina infection encountered in mentally afflicted individuals hospitalized in a single institution over varying periods of time, other evidence indicated that most, if not all, of the infections were probably acquired before admission to the institution and that probably exposure to trichinosis was of much less degree than that encountered in the outside world.

Evidence obtained from the present survey indicates very strikingly that within the continental limits of the United States exposure to trichinosis is nearly uniform in degree regardless of geographical or environmental factors. Such evidence therefore points to the need not for the enactment of control measures in localized areas but for the treatment of the problem on a nation-wide basis either through concerted action on the part of the States or assumption of control by the Federal government.

REFERENCES

(*1*) Wright, Willard H., Kerr, K. B., and Jacobs, Leon: Studies on trichinosis. XV. Summary of the findings of *Trichinella spiralis* in a random sampling and other samplings of the population of the United States. Pub. Health Rep., **58:** 1293–1313 (Aug. 27, 1943).

(*2*) Hall, Maurice C., and Collins, Benjamin J.: Studies on trichinosis. II. Some correlations and implications in connection with the incidence of trichinae found in 300 diaphragms. Pub. Health Rep., **52:** 512–527 (Apr. 23, 1937).

(*3*) Hall, Maurice C.: Studies on trichinosis. VI. Epidemiological aspects of trichinosis in the United States as indicated by an examination of 1,000 diaphragms for trichinae. Pub. Health Rep., **53:** 1086–1105 (July 1, 1938).

(*4*) Babes, Victor: Ein 21 Jahre alter Fall von Trichinose mit lebenden Trichinen. Centralbl. Bakteriol. 1 Abt., Orig., **42:** 541–545 (Oct. 29); 616–619 (Nov. 19, 1906).

(*5*) Turner, Dawson F. D.: Trichinosis. Lancet, **1:** 934 (May 11, 1889).

(*6*) Nolan, M. O., and Bozicevich, John: Studies on trichinosis. V. The incidence of trichinosis as indicated by post-mortem examinations of 1,000 diaphragms. Pub. Health Rep., **53:** 652–673 (Apr. 29, 1938).

(*7*) Dammann, Carl: Zur Frage der Lebensdauer under der Verkapselung der Trichinen bei dem Schweine. Deutsche Ztschr. Thiermed., **3:** 92–95 (30 Nov., 1876).

PAPERS IN THE SERIES

I. The incidence of trichinosis as indicated by post-mortem examinations of 300 diaphragms. By Maurice C. Hall and Benjamin J. Collins. Pub. Health Rep., **52:** 468–490 (Apr. 16, 1937).

II. Some correlations and implications in connection with the incidence of trichinae found in 300 diaphragms. By Maurice C. Hall and Benjamin J. Collins. Pub. Health Rep., **52:** 512–527 (Apr. 23, 1937).

III. The complex clinical picture of trichinosis and the diagnosis of the disease. By Maurice C. Hall. Pub. Health Rep., **52:** 539–551 (Apr. 30, 1937).

IV. The role of the garbage-fed hog in the production of human trichinosis. By Maurice C. Hall. Pub. Health Rep., **52:** 873–886 (July 2, 1937).

V. The incidence of trichinosis as indicated by post-mortem examinations of 1,000 diaphragms. By M. O. Nolan and John Bozicevich. Pub. Health Rep., **53:** 652–673 (Apr. 29, 1938).

VI. Epidemiological aspects of trichinosis in the United States as indicated by an examination of 1,000 diaphragms for trichinae. By Maurice C. Hall. Pub. Health Rep., **53:** 1086–1105 (July 1, 1938).

VII. The past and present status of trichinosis in the United States, and the indicated control measures. By Maurice C. Hall. Pub. Health Rep., **53:** 1472–1486 (Aug. 19, 1938).

VIII. The antigenic phase of trichinosis. By John Bozicevich and Laszlo Detre. Pub. Health Rep., 55: 683–692 (Apr. 19, 1940).

IX. The part of the veterinary profession in the control of human trichinosis. By Willard H. Wright. J. Am. Vet. Med. Assoc., 94: 601–608 (June 1939).

X. The incidence of light infestations of dead trichinae in man. By Leon Jacobs. J. Wash. Acad. Sci., 28: 452–455 (Oct. 15, 1938).

XI. The epidemiology of *Trichinella spiralis* and measures indicated for the control of trichinosis. By Willard H. Wright. Am. J. Pub. Health, 29: 119–127 (February 1939).

XII. The preparation and use of an improved trichina antigen. By John Bozicevich. Pub. Health Rep., 53: 2130–2138 (Dec. 2, 1938).

XIII. The incidence of human infection with trichinae as indicated by postmortem examinations of 3,000 diaphragms from Washington, D. C., and 5 eastern seaboard cities. By K. B. Kerr, Leon Jacobs, and Eugenia Cuvillier. Pub. Health Rep., 56: 836–855 (Apr. 18, 1941).

XIV. A survey of municipal garbage disposal methods as related to the spread of trichinosis. By Willard H. Wright. Pub. Health Rep., 55: 1069–1077 (June 14, 1940).

XV. Summary of the findings of *Trichinella spiralis* in a random sampling and other samplings of the population of the United States. By Willard H. Wright, K. B. Kerr, and Leon Jacobs. Pub. Health Rep., 58: 1293–1313 (Aug. 27, 1943).

PUBLIC HEALTH SERVICE PUBLICATIONS

A List of Publications Issued During the Period July–December 1943

The following is a list of publications of the United States Public Health Service issued during the period July–December 1943.

The purpose of the publication of this list is to provide a complete and continuing record of Public Health Service publications for reference use by librarians, scientific workers, and others interested in particular fields of public health work, and not to offer the publications for indiscriminate free public distribution.

Those publications marked with an asterisk (*) may be obtained only by purchase from the Superintendent of Documents, Government Printing Office, Washington 25, D. C., at the prices noted.

Periodicals

*Public Health Reports (weekly), July–December, vol. 58, Nos. 27 to 53, pages 1001 to 1940. 5 cents a number.

*Venereal Disease Information (monthly), July–December, vol. 24, Nos. 7 to 12, pages 185 to 392. 5 cents a number.

*Journal of the National Cancer Institute (bimonthly), August–December, 1943, vol. 4, Nos. 1 to 3, pages 1 to 338. 40 cents a number.

Public Health Engineering Abstracts (monthly), July–December, vol. XXIII, Nos. 7 to 12. Nos. 7, 8, 9, 10, and 11, each 32 pages; No. 12, 22 pages.

National Negro Health News (quarterly), January–December, vol. 11, Nos. 1 to 4. Nos. 1, 2, 3, each 28 pages; No. 4, 24 pages.

Reprints From the Public Health Reports

2490. Effect of lead absorption on blood calcium. By Wendell V. Jenrette and Lawrence T. Fairhall. July 2, 1943. 5 pages.

2491. Infection in monkeys with strains of *Trypanosoma cruzi* isolated in the United States. By Dorland J. Davis. July 2, 1943. 5 pages; 1 plate.

2492. *Salmonella enteritidis:* Experimental transmission by the Rocky Mountain wood tick *Dermacentor andersoni* Stiles. By R. R. Parker and Edward A. Steinhaus. July 2, 1943. 4 pages.
2493. The tick *Ornithodoros rudis* as a host to the rickettsiae of the spotted fevers of Colombia, Brazil, and the United States. By Gordon E. Davis. July 2, 1943. 4 pages.
2494. Influenza and pneumonia mortality in a group of 90 cities in the United States, August 1935–March 1943 with a summary for August 1920–March 1943. By Mary Gover. July 9, 1943. 29 pages.
2495. Extent of immunization and case histories for diphtheria, smallpox, scarlet fever, and typhoid fever in 200,000 surveyed families in 28 large cities. By Selwyn D. Collins and Clara Councell. July 23, 1943. 32 pages.
2496. Studies on strains of *Aerobacter cloacae* responsible for acute illness among workers using low-grade stained cotton. By B. H. Caminita, R. Schneiter, R. W. Kolb, and P. A. Neal. July 30, 1943. 20 pages; 2 plates.
2497. A soap which indicates the presence of mercury fulminate. By Howard S. Mason and Isadore Botvinick. July 30, 1943. 4 pages.
2498. Experimental transmission of the spotted fevers of the United States, Colombia, and Brazil by the argasid tick *Ornithodoros parkeri*. By Gordon E. Davis. August 6, 1943. 8 pages.
2499. An approach to the mental hygiene public health problem. By Gerhard B. Haugen. August 6, 1943. 4 pages.
2500. Jaundice following administration of human serum. By John W. Oliphant, Alexander G. Gilliam, and Carl L. Larson. August 13, 1943. 10 pages.
2501. Toxic effects of atabrine and sulfadiazine in growing rats. By C. I. Wright and R. D. Lillie. August 13, 1943. 9 pages.
2502. Sickness absenteeism among male and female industrial workers, 1933–42, inclusive. By W. M. Gafafer. August 13, 1943. 4 pages.
2503. The incidence and prevalence of cancer of the lung. By Harold F. Dorn. August 20, 1943. 8 pages.
2504. Carbarsone treatment for *Balantidium coli* infections. By Martin D. Young and Robert Burrows. August 20, 1943. 2 pages.
2505. The mechanism of antitoxic immunity in *Clostridium perfringens* (Welchii) infections in guinea pigs. By Sarah E. Stewart. August 20, 1943. 4 pages; 2 plates.
2506. Studies on trichinosis. XV. Summary of the findings of *Trichinella spiralis* in a random sampling and other samplings of the population of the United States. By Willard H. Wright, K. B. Kerr, and Leon Jacobs. August 27, 1943. 21 pages.
2507. The patient load of physicians in private practice. A comparative statistical study of three areas. By Antonio Ciocco and Isidore Altman September 3, 1943. 24 pages.
2508. Surveys of liquid wastes from munitions manufacturing. By Russell S. Smith and W. W. Walker. September 10 and 17, 1943. 36 pages.
2509. Twenty-year survival of virulent *Bacillus pestis* cultures without transfer. By Edward Francis. September 10, 1943. 4 pages.
2510. Experimental chemotherapy of burns and shock. IV. Production of traumatic shock in mice. V. Therapy with mouse serum and sodium salts. By Sanford M. Rosenthal. September 24, 1943. 8 pages.
2511. Notes on the pathology of experimental trinitrotoluene poisoning. By R. D. Lillie. September 24, 1943. 4 pages.
2512. Tuberculosis mortality in the United States: 1939–41. By J. Yerushalmy, H. E. Hilleboe, and C. E. Palmer. October 1, 1943. 26 pages.

2513. Opportunities in the newer methods of tuberculosis case finding. By Herman E. Hilleboe. July 16, 1943. 8 pages.
2514. A study of an outbreak of food poisoning in a hospital in Galveston, Texas. By L. L. Lumsden, C. A. Nau, and F. M. Stead. October 8, 1943. 10 pages.
2515. American Q fever: the occurrence of *Rickettsia diaporica* in *Amblyomma americanum* in eastern Texas. By R. R. Parker and Glen M. Kohls. October 8, 1943. 2 pages.
2516. Harborage of *Rattus rattus alexandrinus*. By B. K. Milmore. October 8, 1943. 4 pages.
2517. The automatic control of exposure in photofluorography. By Russell H. Morgan. October 15, 1943. 9 pages; 2 plates.
2518. The successful treatment of granulocytopenia and leukopenia in rats with crystalline folic acid. By Floyd S. Daft and W. H. Sebrell. October 15, 1943. 4 pages.
2519. The war and the distribution of physicians. By G. St. J. Perrott and Burnet M. Davis. October 15, 1943. 10 pages.
2520. Frequency and duration of disabilities causing absence from work among the employees of a public utility, 1938–42. By W. M. Gafafer. October 15, 1943. 8 pages.
2521. The physically handicapped By Bernard D. Karpinos. October 22, 1943. 20 pages.
2522. Surveys of milk laboratories in war areas in the United States. I. Practices observed in making agar plate counts. II. Practices observed in making direct microscopic examinations and methylene blue reduction tests. III. Observations on sampling and health department practice relative to bacteriological milk analysis. By Luther A. Black. October 29, November 5 and 12, 1943. 43 pages.
2523. An outbreak of dermatitis from hair lacquer. By Louis Schwartz. October 29, 1943. 2 pages.
2524. The effect of topically applied sodium fluoride on dental caries experience. By John W. Knutson and Wallace D. Armstrong. November 19, 1943. 13 pages.
2525. The identification of first stage larvae of Puerto Rican *Anopheles*. By Harry D. Pratt. November 19, 1943. 4 pages.
2526. Experimental transmission of the rickettsiae of the spotted fevers of Brazil, Colombia, and the United States by the argasid tick *Ornithodoros nicollei*. By Gordon E. Davis. November 26, 1943. 3 pages.
2527. The detection and analysis of arsenic in water contaminated with chemical warfare agents. By C. C. Ruchhoft, O. R. Placak, and Stuart Schott. December 3, 1943. 12 pages.
2528. Smallpox in relation to State vaccination laws and regulations. By Brock C. Hampton. December 3, 1943. 8 pages.
2529. Emergency minimum sanitation standards. December 10, 1943. 32 pages.
2530. Influence of pH and temperature on the survival of coliforms and enteric pathogens when exposed to free chlorine. By C. T. Butterfield, Elsie Wattie, Stephen Megregian, and C. W. Chambers. December 17, 1943. 30 pages.
2531. The promin treatment of leprosy. A progress report. By G. H. Faget, R. C. Pogge, F. A. Johansen, J. F. Dinan, B. M. Prejean, and C. G. Eccles. November 26, 1943. 13 pages.
2532. The use of curtain walls in ratproofing. By Ralph Porges. December 24, 1943. 5 pages.

2533. The benefits accruing from the ratproof construction of vessels. By G. C. Sherrard. December 24, 1943. 4 pages.
2534. A survey of statistical studies on the prevalence and incidence of mental disorder in sample populations. By Paul Lemkau, Christopher Tietze, and Marcia Cooper. December 31, 1943. 20 pages.

Supplements to the Public Health Reports

133. Public health nursing. By Pearl McIver. Revised 1943. 19 pages.
173. Recommended wartime refuse disposal practice. With particular reference to the sanitary landfill method of disposal for mixed refuse. By C. C. Spencer. 1943. 19 pages.

Public Health Bulletin

280. Ordinance and code regulating eating and drinking establishments. Recommended by the United States Public Health Service. 1943. 60 pages; 9 halftones.

Miscellaneous Publication

11. Official list of commissioned and other officers of the United States Public Health Service, also a list of all stations of the Service, January 1, 1943. 1943. 91 pages.

Workers' Health Series

11. Hold on to your teeth. 1943. 7 pages.

Community Health Series

1. Wake up Main Street. Illustrated folder. 1943. 6 pages.
2. Safe water. Illustrated folder. 1943. 8 pages.
3. From hand to mouth. 1943. 48 pages, illustrated.

Posters

Community Health Posters.

1. Safe water on the farm. Four colors, 22 x 28 in. Illustrator, Robbins. 1943.
2. Saboteur—rats spread plague, spread typhus, destroy food, destroy property, start fires. Four colors, 10 x 14 in. Illustrator, Jex. 1943.

Malaria Control Posters—Set of five, four-color, each 14 x 10 in. Illustrator, Margo. 1943.

1. Mosquitoproof your home.
2. Keep out malaria mosquitos, repair your torn screens.
3. Spray to kill, malaria mosquitoes hide in your home.
4. Protect yourself, mosquitoproof your home.
5. Dust paris green on swamps and ponds.

Malaria Control Poster No. 7—Fight mosquitoes at home, spray, screen, cover cracks. 28 x 20 in., four colors. Illustrator, Margo. 1943.

Nurse Recruitment Posters.

Become a nurse—your country needs you. Four colors, 17.4 x 13.9 in. Illustrator, Muray. Write to Nursing Information Bureau, 1790 Broadway, New York, New York.

Enlist in a proud profession! Join the U. S. Cadet Nurse Corps. Four colors, sizes 14½ x 20, 19⅞ x 23⅞, 20 x 28, 23⅞ x 21⅞, and 40 x 56 in. Illustrator, Edmundson.

Tuberculosis Posters—Three, four-color, each 10 x 14 in.

1. You may look healthy but what does your chest X-ray show? Illustrator, Robbins.
2. Health wanted, have your chest X-rayed, find TB early. Illustrator, Kula.
3. Have your picture taken, guard against tuberculosis. Illustrators, Kula and Robbins.

Unnumbered Publications

U. S. Cadet Nurse Corps.

65,000 women needed. Information leaflet.

Fact sheet. 6 page folder.

What school will you choose? 4 page folder.

Get free training with pay in the world's proudest profession. 6 page folder, illustrated.

Enlist in a proud profession. Train as a nurse! U. S. Cadet Nurse Corps. 20 pages, illustrated.

How advertisers can cooperate with the U. S. Cadet Nurse Corps. 12 pages, illustrated.

Index to Public Health Reports, volume 58, part 1, January–June 1943. 18 pages.

Malaria Control Folder. 8 pages, illustrated.

Industrial hygiene education materials. 1943. 32 pages, illustrated.

Reprints From Venereal Disease Information

200. The management of gonorrhea in general practice. Procedures recommended by the American Neisserian Medical Society. Vol. 24, May 1943. 8 pages.
201. Laboratory procedures in the diagnosis of gonococcal infection. By Charles M. Carpenter. Vol. 24, May 1943. 11 pages.
202. Social and legal problems in the wartime venereal disease control program. By Charles P. Taft. Vol. 24, June 1943. 5 pages.
203. An experimental evaluation of intensive methods for the treatment of early syphilis. III. Clinical implications. By Harry Eagle and Ralph B. Hogan. Vol. 24, June 1943. 12 pages.
204. Fitness for freedom. By Thomas Parran. Vol. 24, July 1943. 5 pages.
205. Substitutes for spinal fluids as colloidal gold controls. By H. N. Bossak, A. A. Rosenberg, and Ad Harris. Vol. 24, July 1943. 4 pages.
206. The results of the follow-up of patients treated for early syphilis by rapid methods at Bellevue Hospital. By Russell J. Hammond, James A. MacPhail, and Evan W. Thomas. Vol. 24, August 1943. 4 pages.
207. Comparison of results obtained with culture of urine and urethral secretion in the detection of gonorrhea. By George Sewell, Paul T. Salchow, and Everett A. Nelson. Vol. 24, August 1943. 4 pages.
208. The facilitation process and venereal disease control. A study of source finding and suppression of facilitation in the Greater Vancouver Area. By Donald H. Williams. Vol. 24, September 1943. 12 pages.
209. Venereal disease epidemiology in the Army Third Service Command. Progress report for period January through June 1943. By E. W. Norris, A. F. Doyle, and Albert P. Iskrant. Vol. 24, October 1943. 8 pages.
210. The male investigator in venereal disease control follow-up. By Malcolm H. Merrill. Vol. 24, November 1943. 6 pages.

211. A method of inducing therapeutic fever with typhoid vaccine using the intravenous drip technic. By Harry C. Knight, Mayo L. Emory, and Lloyd D. Flint. Vol. 24, November 1943. 8 pages.
212. Penicillin treatment of early syphilis. A preliminary report. By J. F. Mahoney, R. C. Arnold, and Ad Harris. Vol. 24, December 1943. 4 pages.

Supplement to Venereal Disease Information

19. Management of chancroid, granuloma inguinale, and lymphogranuloma venereum in general practice. By Robert B. Greenblatt. 43 pages.

Venereal Disease Folders

5. (R. 43) Gonorrhea, the crippler . . . cured. 8 pages.

Unnumbered Publications

V. D. Stamps. "Stamp Out V. D."

FELLOWSHIPS IN HEALTH EDUCATION

In order to meet an increasing need for health educators, fellowships for graduate study and experience in health education will be offered to qualified women this fall. The awards will be made by the United States Public Health Service through funds made available by the W. K. Kellogg Foundation and will lead to a master of science degree in public health

These fellowships will provide 12 months of training in public health education, 9 months of which will be academic work in public health and public health education, and 3 months supervised field experience. A stipend of $100 a month for 12 months, full tuition, and travel for field experience is included.

Owing to the wartime shortage of men for duty in the armed forces, industry, and essential civilian services, only women will be considered for fellowships at this time. Women between the ages of 19 and 40 years, inclusive, who are citizens of the United States, and who possess a bachelor of science degree, or its equivalent, from a recognized college or university may apply. Although standardized training cannot be specified as a qualification in a field as new as public health education, it is desirable that a candidate present a background including as many as possible of the following areas of knowledge and skill: A broad cultural education, including skills ir the use of the English language; the basic sciences; training in education and educational psychology; and social science education to provide an appreciation of the importance of respect for human personality and government.

One of the personal qualifications needed for community education is the ability to work effectively with people. Adaptability, creative

ability, leadership, and sound judgment are other essential qualities for the health educator to possess, plus good health and a pleasing appearance.

The demand for qualified health educators has increased in the past few years to such an extent that at present there are not enough trained personnel to meet existing needs. Expanding fields are opening to the health educator through the local, State, and Federal health departments, schools, and voluntary agency programs of community and school health education. Leading public health authorities have recommended that a health educator be added to every local health department in the country, and the need for health education personnel abroad is foreseen.

Forms for application for fellowships may be obtained from the Surgeon General, United States Public Health Service, Washington 14, D. C. Applications must be accompanied by a transcript of college credits and a small photograph, and must be in the office of the Surgeon General not later than August 1, 1944.

DEATHS DURING WEEK ENDED MAY 13, 1944

[From the Weekly Mortality Index, issued by the Bureau of the Census, Department of Commerce]

	Week ended May 13, 1944	Corresponding week, 1943
Data for 92 large cities of the United States:		
Total deaths	9,044	9,389
Average for 3 prior years	8,614	
Total deaths, first 19 weeks of year	186,531	189,350
Deaths under 1 year of age	584	651
Average for 3 prior years	576	
Deaths under 1 year of age, first 19 weeks of year	11,844	13,137
Data from industrial insurance companies:		
Policies in force	66,516,228	65,527,004
Number of death claims	12,406	14,845
Death claims per 1,000 policies in force, annual rate	9.8	11.8
Death claims per 1,000 policies, first 19 weeks of year, annual rate	10.9	10.6

PREVALENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED MAY 20, 1944

Summary

Following an increase last week, the incidence of meningococcus meningitis again declined. A total of 385 cases was reported for the current week, as compared with 420 last week, 382 for the next earlier week, 544 for the corresponding week last year, and 48 for the 5-year (1939–43) median. Increases were reported currently only in the Middle Atlantic and West Central areas. Eight States reporting 19 or more cases each are as follows (last week's figures in parentheses): *Increases*—New York 47 (45), Pennsylvania 36 (25), Illinois 36 (29); Texas 21 (10); *decreases*—Ohio 21 (28), Michigan 27 (28), California 19 (43); *no change*—Missouri 19 (19). A total of 10,270 cases has been reported for the year to date, as compared with 9,849 for the same period last year. However, weekly totals have been below last year's corresponding figures since February 26, and the total reported since that date is 5,205, as compared with 6,310 for the corresponding period last year. The comparable figure in 1942 was 994.

A total of 36 cases of poliomyelitis was reported, as compared with 37 last week, 36 for the corresponding week last year, and a 5-year median of 26. Of the current total, 8 cases were reported in California, 7 in Louisiana, and 4 in Texas. The cumulative figure is 462, as compared with 519 for the same period last year, and a 5-year median of 454.

Of the current total of 115 cases of typhoid fever, as compared with 86 last week and a 5-year median of 98, California reported 21, Texas 11, and Louisiana 9. The total increase is accounted for chiefly by increased incidence in the South Atlantic and East South Central areas.

The incidence of measles and scarlet fever for the country as a whole continued to decline. For measles the figures are lower in all of the nine geographic divisions, and for scarlet fever in all except the New England area. The current totals are 22,881 for measles and 5,425 for scarlet fever, as compared with 5-year medians of 20,966 and 3,672 respectively.

A total of 8,841 deaths was recorded for the week in 92 large cities of the United States, as compared with 9,054 last week and a 3-year (1941–43) average of 8,560. The cumulative total is 195,659, as compared with 198,620 for the same period last year.

Telegraphic morbidity reports from State health officers for the week ended May 20, 1944, and comparison with corresponding week of 1943 and 5-year median

In these tables a zero indicates a definite report, while leaders imply that, although none was reported, a may have occurred.

Division and State	Diphtheria			Influenza			Measles			Meningitis, meningococcus		
	Week ended—		Median 1939–43	Week ended—		Median 1939–43	Week ended—		Median 1939–43	Week ended—		Median 1939–43
	May 20, 1944	May 22, 1943		May 20, 1944	May 22, 1943		May 20, 1944	May 22, 1943		May 20, 1944	May 22, 1943	
NEW ENGLAND												
Maine	1	0	1	2	----	----	239	55	141	0	7	0
New Hampshire	0	0	0	----	----	----	20	60	40	0	1	0
Vermont	0	0	0	----	----	----	66	233	83	0	0	0
Massachusetts	6	2	5	----	----	----	944	1,844	1,219	7	18	4
Rhode Island	1	0	0	10	----	----	44	39	80	1	18	0
Connecticut	0	6	2	2	----	----	554	438	467	9	11	1
MIDDLE ATLANTIC												
New York	13	19	18	[1] 3	[1] 4	[1] 5	1,316	3,539	2,251	47	89	6
New Jersey	1	2	5	1	13	5	1,261	2,320	887	10	41	1
Pennsylvania	10	11	15	3	1	----	675	1,972	1,591	36	39	4
EAST NORTH CENTRAL												
Ohio	5	7	7	12	16	11	316	734	469	21	22	1
Indiana	5	3	3	----	13	9	103	458	58	3	11	1
Illinois	17	19	17	9	6	6	536	1,734	319	36	19	0
Michigan [2]	9	3	5	1	3	2	661	4,574	802	27	18	0
Wisconsin	0	4	1	31	39	39	2,271	2,319	1,383	8	10	1
WEST NORTH CENTRAL												
Minnesota	3	1	2	----	2	2	388	435	266	11	4	0
Iowa	5	3	3	2	2	1	185	127	205	8	4	1
Missouri	1	3	5	1	4	1	201	308	247	19	12	1
North Dakota	0	2	1	----	3	2	68	101	56	3	0	0
South Dakota	2	0	1	----	----	----	21	227	21	0	0	0
Nebraska	3	1	1	2	1	----	320	195	195	2	0	0
Kansas	5	2	2	2	----	3	352	494	458	8	3	1
SOUTH ATLANTIC												
Delaware	0	0	0	----	----	----	46	168	11	0	1	0
Maryland [2]	14	5	5	1	8	3	420	216	318	8	18	3
District of Columbia	0	0	1	3	1	----	178	119	119	3	6	0
Virginia	2	4	6	53	110	107	601	376	376	8	25	6
West Virginia	4	7	7		----	13	257	97	51	5	3	1
North Carolina	8	5	6		4	4	1,024	402	402	6	16	1
South Carolina	4	5	5	175	215	215	270	87	87	2	5	0
Georgia	6	3	3	8	18	23	126	75	109	3	3	0
Florida	3	3	3	3	19	16	154	52	93	5	10	0
EAST SOUTH CENTRAL												
Kentucky	1	5	4	8	9	9	119	258	152	9	9	1
Tennessee	0	3	2	15	21	37	111	277	166	6	32	3
Alabama	1	0	3	23	264	119	201	114	114	7	9	1
Mississippi [2]	5	2	3	----	----	----	----	----	----	6	10	4
WEST SOUTH CENTRAL												
Arkansas	2	8	3	17	3	29	112	64	121	0	2	0
Louisiana [2]	4	4	5	2	4	4	76	48	52	12	5	1
Oklahoma	4	2	3	53	8	28	369	71	74	0	1	0
Texas	23	22	22	305	482	410	2,664	443	733	21	11	3
MOUNTAIN												
Montana	1	0	0	6	6	6	118	175	113	0	0	0
Idaho	0	0	0	----	1	----	9	56	56	0	3	0
Wyoming	1	0	0	----	11	1	51	163	52	1	0	0
Colorado	6	6	6	14	20	14	315	451	248	2	2	0
New Mexico	5	1	0	4	2	1	122	32	41	0	1	1
Arizona	3	0	0	48	61	61	116	16	125	0	2	0
Utah [2]	0	0	0	----	6	6	42	98	151	1	2	0
Nevada	3	0	0	----	----	----	11	2	0	0	0	0
PACIFIC												
Washington	2	2	1	5	2	----	342	386	486	2	9	0
Oregon	0	3	8	15	68	15	115	218	197	3	6	0
California	18	16	16	61	51	51	4,371	1,053	1,053	19	31	2
Total	207	194	194	900	1,501	1,275	22,881	27,723	20,966	385	544	48
20 weeks	4,552	5,120	5,446	331,657	72,641	145,395	508,328	396,365	372,782	10,270	9,849	973

See footnotes at end of table.

Telegraphic morbidity reports from State health officers for the week ended May 20, 1944, and comparison with corresponding week of 1943 and 5-year median—Con.

Division and State	Poliomyelitis			Scarlet fever			Smallpox			Typhoid and paratyphoid fever [3]		
	Week ended—		Median 1939–43	Week ended—		Median 1939–43	Week ended—		Median 1939–43	Week ended—		Median 1939–43
	May 20, 1944	May 22, 1943		May 20, 1944	May 22, 1943		May 20, 1944	May 22, 1943		May 20, 1944	May 22, 1943	
NEW ENGLAND												
Maine	1	0	0	57	16	12	0	0	0	1	0	0
New Hampshire	0	0	0	6	7	4	0	0	0	0	0	0
Vermont	0	0	0	11	18	9	0	0	0	0	0	0
Massachusetts	0	0	0	377	537	214	0	0	0	4	2	2
Rhode Island	1	0	0	11	37	19	0	0	0	0	0	0
Connecticut	0	0	0	85	110	53	0	0	0	1	0	0
MIDDLE ATLANTIC												
New York	2	0	0	470	569	554	0	0	0	3	14	9
New Jersey	1	1	1	262	137	229	0	0	0	1	1	2
Pennsylvania	1	0	0	486	269	324	0	0	0	2	8	4
EAST NORTH CENTRAL												
Ohio	1	0	0	453	231	231	1	6	0	4	5	5
Indiana	1	0	0	106	59	82	2	1	1	1	1	3
Illinois	1	1	1	391	161	298	1	1	1	1	2	4
Michigan [2]	0	0	0	304	129	255	0	0	1	2	3	3
Wisconsin	0	1	0	269	386	128	0	0	2	0	1	0
WEST NORTH CENTRAL												
Minnesota	1	0	0	130	69	69	0	0	0	0	0	1
Iowa	0	0	0	137	41	41	0	0	5	0	0	1
Missouri	0	0	0	97	44	52	0	0	0	0	1	0
North Dakota	0	0	0	26	6	6	0	0	0	0	0	0
South Dakota	0	0	0	23	14	14	0	0	1	0	0	0
Nebraska	0	0	0	64	20	11	1	0	0	0	0	0
Kansas	0	2	1	70	37	47	1	1	1	0	0	1
SOUTH ATLANTIC												
Delaware	0	0	0	6	5	6	0	0	0	0	0	0
Maryland [2]	0	0	0	204	100	49	0	0	0	0	0	1
District of Columbia	0	0	0	96	12	12	0	0	0	1	0	0
Virginia	0	1	1	46	32	19	0	0	0	6	1	4
West Virginia	0	1	0	121	15	25	0	1	0	2	2	2
North Carolina	0	0	0	27	21	16	0	0	0	7	0	1
South Carolina	3	1	1	8	2	2	3	0	0	5	0	1
Georgia	1	0	0	30	1	13	0	0	2	6	5	5
Florida	0	0	1	8	25	6	0	0	0	1	5	4
EAST SOUTH CENTRAL												
Kentucky	0	1	1	53	14	48	0	0	1	7	3	5
Tennessee	0	0	0	59	26	43	0	1	1	6	3	3
Alabama	0	0	0	9	5	7	2	0	0	3	3	3
Mississippi [2]	1	3	1	6	11	3	1	1	1	4	1	1
WEST SOUTH CENTRAL												
Arkansas	0	0	1	4	2	3	0	1	1	2	4	2
Louisiana [2]	7	2	1	7	7	7	0	0	0	9	4	7
Oklahoma	0	0	0	42	10	10	0	1	0	0	3	3
Texas	4	4	1	52	33	33	0	0	4	11	10	7
MOUNTAIN												
Montana	0	0	0	41	11	12	0	0	0	0	0	0
Idaho	0	0	0	14	119	2	0	0	0	0	0	0
Wyoming	0	0	0	16	34	9	0	0	0	1	0	0
Colorado	0	0	0	60	69	30	0	1	2	0	0	1
New Mexico	0	0	0	21	4	2	0	0	0	0	1	1
Arizona	1	3	0	26	8	8	0	0	0	1	0	1
Utah [2]	0	0	0	70	31	20	0	0	0	0	0	0
Nevada	0	0	0	1	0	0	0	0	0	0	0	0
PACIFIC												
Washington	1	2	1	221	30	30	0	0	1	2	2	0
Oregon	0	0	0	95	22	8	0	1	1	0	0	0
California	8	13	3	252	140	134	1	0	0	21	5	5
Total	36	36	26	5,425	3,666	3,672	13	16	61	115	85	98
20 weeks	462	519	454	128,855	79,410	79,410	287	517	919	1,491	1,168	1,600

See footnotes at end of table.

Telegraphic morbidity reports from State health officers for the week ended May 20, 1944, and comparison with corresponding week of 1943 and 5-year median—Con.

Division and State	Whooping cough: Week ended—May 20, 1944	Whooping cough: Week ended—May 22, 1943	Whooping cough: Median 1939-43	Week ended May 20, 1944: Anthrax	Dysentery: Amebic	Dysentery: Bacillary	Dysentery: Unspecified	Encephalitis, infectious	Leprosy	Rocky Mt. spotted fever	Tularemia	Typhus fever
NEW ENGLAND												
Maine	0	23	23	0	0	0	0	0	0	0	0	0
New Hampshire	0	0	4	0	0	0	0	0	0	0	0	0
Vermont	0	10	23	0	0	0	0	0	0	0	0	0
Massachusetts	66	132	176	0	0	1	0	0	0	0	0	0
Rhode Island	15	41	41	0	0	0	0	0	0	0	0	0
Connecticut	35	81	74	0	0	1	0	0	0	0	0	0
MIDDLE ATLANTIC												
New York	151	260	322	0	1	5	0	1	0	0	0	3
New Jersey	46	189	189	0	0	0	0	1	0	0	0	0
Pennsylvania	50	213	276	0	0	0	0	0	0	0	0	0
EAST NORTH CENTRAL												
Ohio	73	167	201	0	2	0	0	0	0	0	0	0
Indiana	12	51	35	0	0	0	0	0	0	0	0	0
Illinois	42	100	110	0	1	0	0	0	0	0	0	0
Michigan [3]	83	291	233	0	1	5	0	0	0	0	0	0
Wisconsin	49	273	170	0	0	0	0	0	0	0	0	0
WEST NORTH CENTRAL												
Minnesota	10	78	51	0	2	0	0	0	0	0	1	0
Iowa	13	44	30	0	0	0	0	0	0	0	0	0
Missouri	15	21	19	0	0	0	1	0	0	1	0	0
North Dakota	0	4	10	0	0	0	0	0	0	2	0	0
South Dakota	4	2	2	0	0	0	0	0	0	0	0	0
Nebraska	3	13	13	0	0	0	0	0	0	0	0	0
Kansas	46	80	42	0	1	0	1	0	0	0	0	0
SOUTH ATLANTIC												
Delaware	0	3	5	0	0	0	0	0	0	0	0	0
Maryland [2]	49	103	77	0	0	0	1	1	0	0	0	0
District of Columbia	8	24	15	0	0	0	0	0	0	0	0	0
Virginia	47	155	96	0	0	0	84	0	0	2	0	0
West Virginia	7	52	50	0	0	0	0	0	0	0	0	0
North Carolina	110	257	218	0	0	0	0	0	0	1	0	2
South Carolina	105	45	105	0	0	14	0	0	0	0	0	1
Georgia	9	23	43	0	2	4	1	0	0	0	2	12
Florida	22	7	13	0	0	81	0	0	1	0	0	15
EAST SOUTH CENTRAL												
Kentucky	62	7	67	0	0	0	0	0	0	0	0	0
Tennessee	30	58	45	0	0	0	2	0	0	0	1	0
Alabama	22	61	61	0	0	0	0	0	0	0	0	6
Mississippi [2]	---	---	---	0	0	0	0	0	0	0	2	2
WEST SOUTH CENTRAL												
Arkansas	22	39	32	0	3	3	0	0	0	0	4	0
Louisiana [2]	4	8	24	0	3	1	0	0	0	0	0	4
Oklahoma	3	35	26	0	0	0	0	0	0	0	0	0
Texas	288	621	309	0	3	321	0	2	0	0	1	39
MOUNTAIN												
Montana	4	14	14	0	0	0	0	0	0	0	0	0
Idaho	0	0	7	0	0	0	0	0	0	0	0	0
Wyoming	2	1	3	0	0	0	0	0	0	3	1	0
Colorado	34	30	30	0	0	1	0	0	0	0	0	0
New Mexico	5	16	23	0	1	1	0	0	0	0	0	0
Arizona	9	18	18	0	0	0	38	1	0	0	0	0
Utah [2]	69	67	72	0	1	0	0	0	0	0	0	0
Nevada	0	0	0	0	0	0	0	0	0	0	0	0
PACIFIC												
Washington	15	25	43	0	0	0	0	0	0	0	0	0
Oregon	10	28	28	0	0	0	0	0	0	0	0	0
California	112	561	501	0	2	11	0	1	0	0	0	1
Total	1,761	4,331	3,767	0	23	449	128	7	1	9	12	85
20 weeks	35,975	81,117	80,002	17	509	4,875	1,432	216	13	31	211	877
20 weeks, 1943	------	------	------	26	597	4,111	987	219	9	65	344	919

[1] New York City only. [2] Period ended earlier than Saturday.

[3] Including paratyphoid fever cases reported separately, as follows: Massachusetts, 4; Connecticut, 1; Michigan, 1; South Carolina, 4; Florida, 1; Arkansas, 1; Texas, 1; Washington, 1.

WEEKLY REPORTS FROM CITIES

City reports for week ended May 6, 1944

This table lists the reports from 87 cities of more than 10,000 population distributed throughout the United States, and represents a cross section of the current urban incidence of the diseases included in the table.

	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
NEW ENGLAND												
Maine:												
Portland	0	0	—	0	38	1	4	0	15	0	0	0
New Hampshire:												
Concord	0	0	—	0	2	0	2	0	1	0	0	1
Vermont:												
Barre	0	0	—	0	0	0	0	0	2	0	0	0
Massachusetts:												
Boston	1	0	—	0	180	7	20	0	72	0	0	14
Fall River	0	0	—	0	31	1	0	0	4	0	0	2
Springfield	0	0	—	0	45	1	0	0	24	0	0	4
Worcester	0	0	—	0	5	0	11	0	33	0	0	2
Rhode Island:												
Providence	1	1	—	0	72	1	0	0	5	0	0	4
Connecticut:												
Bridgeport	0	0	—	0	10	0	3	0	1	0	0	0
Hartford	0	0	—	0	5	0	2	0	38	0	0	2
New Haven	0	0	—	0	62	0	0	0	3	0	0	0
MIDDLE ATLANTIC												
New York:												
Buffalo	0	0	—	0	6	0	4	0	12	0	0	0
New York	12	1	1	0	968	35	66	1	329	0	1	37
Rochester	0	0	—	0	15	1	4	0	10	0	1	2
Syracuse	0	0	—	0	5	0	7	0	7	0	0	4
New Jersey:												
Camden	0	0	—	0	6	0	0	0	49	0	0	0
Newark	0	0	3	0	185	3	4	0	30	0	0	2
Trenton	0	0	—	0	9	2	1	0	4	0	0	0
Pennsylvania:												
Philadelphia	2	0	2	2	63	11	37	0	108	0	0	14
Pittsburgh	1	0	1	2	10	9	14	0	19	0	0	6
Reading	0	0	—	0	5	0	5	0	5	0	0	0
EAST NORTH CENTRAL												
Ohio:												
Cincinnati	1	0	0	0	29	5	2	0	66	0	0	7
Cleveland	0	0	2	0	63	5	9	—	128	0	0	7
Columbus	1	0	2	2	29	3	3	0	13	0	0	7
Indiana:												
Fort Wayne	0	0	—	0	0	0	1	0	0	0	0	0
Indianapolis	2	0	—	1	35	0	6	0	43	0	0	2
South Bend	0	0	—	0	5	1	0	0	5	0	0	0
Terre Haute	0	0	—	0	2	0	1	0	2	0	0	0
Illinois:												
Chicago	1	0	1	1	145	20	20	0	153	0	0	8
Springfield	0	0	—	0	47	0	2	0	2	0	0	1
Michigan:												
Detroit	1	0	1	1	110	12	7	0	148	0	1	11
Flint	0	0	—	0	8	0	5	0	1	0	0	6
Grand Rapids	0	0	—	0	39	0	0	0	6	0	0	1
Wisconsin:												
Kenosha	0	0	—	0	280	0	0	0	2	0	0	0
Milwaukee	0	1	1	1	195	2	7	0	59	0	0	19
Racine	0	0	1	1	114	1	0	0	3	0	0	3
Superior	0	0	—	0	0	0	0	0	26	0	0	0
WEST NORTH CENTRAL												
Minnesota:												
Duluth	0	0	—	1	91	0	4	0	12	0	0	2
Minneapolis	3	0	—	0	181	3	18	0	51	0	0	4
St. Paul	1	0	—	0	118	0	5	0	27	0	0	4
Missouri:												
Kansas City	0	0	—	0	80	1	6	0	36	0	0	0
St. Joseph	0	0	—	0	4	0	0	0	3	0	0	0
St. Louis	0	0	2	0	52	8	9	0	52	0	2	5

City reports for week ended May 6, 1944—Continued

	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
WEST NORTH CENTRAL—continued												
Nebraska:												
Omaha	0	0	----	0	94	1	4	0	19	0	0	1
Kansas:												
Topeka	0	0	--	0	115	0	1	0	5	0	0	----
Wichita	1	0	--	0	15	1	2	0	12	0	0	5
SOUTH ATLANTIC												
Delaware:												
Wilmington	1	0	----	0	1	1	4	0	1	0	0	0
Maryland:												
Baltimore	7	0	1	0	470	8	7	0	129	0	0	21
Cumberland	0	0	----	0	0	0	0	0	0	0	0	0
Frederick	0	0	----	0	0	0	0	0	3	0	0	0
District of Columbia:												
Washington	0	0	1	0	179	0	4	0	146	0	1	3
Virginia:												
Lynchburg	0	0	------	0	5	0	0	0	2	0	0	0
Richmond	0	0	1	0	48	2	3	0	3	0	0	2
Roanoke	0	0	------	0	7	0	1	0	0	0	0	8
West Virginia:												
Wheeling	0	0	----	0	38	0	1	0	8	0	0	1
North Carolina:												
Wilmington	0	0	------	0	37	0	1	0	1	0	0	5
Winston-Salem	0	0	------	0	29	0	0	0	1	0	0	0
South Carolina:												
Charleston	0	0	------	0	2	0	4	0	0	0	0	0
Georgia:												
Atlanta	0	0	2	0	18	3	2	0	13	0	0	0
Brunswick	0	0	------	0	4	0	1	0	1	0	0	0
Savannah	0	0	------	0	0	0	0	0	0	0	0	0
Florida:												
Tampa	1	0	2	0	15	0	0	0	1	0	0	1
EAST SOUTH CENTRAL												
Tennessee:												
Memphis	0	0	3	0	20	1	8	0	24	0	0	9
Nashville	0	0	------	0	0	0	1	0	0	0	0	0
Alabama:												
Birmingham	0	0	------	0	6	0	1	0	3	0	0	0
Mobile	0	0	------	0	0	2	1	0	0	0	0	0
WEST SOUTH CENTRAL												
Arkansas:												
Little Rock	0	0	1	0	19	0	1	0	0	0	0	0
Louisiana:												
New Orleans	2	0	5	2	26	8	6	1	6	0	1	0
Shreveport	1	0	------	0	0	0	4	0	0	0	1	0
Texas:												
Dallas	2	0	------	0	184	0	3	0	6	0	0	8
Galveston	0	0	------	0	0	0	1	0	0	0	0	0
Houston	1	0	------	0	6	0	5	0	2	0	0	0
San Antonio	0	0	2	1	12	2	7	0	0	0	1	2
MOUNTAIN												
Montana:												
Billings	0	0	------	0	31	0	0	0	1	0	0	0
Great Falls	0	0	------	0	4	0	3	0	0	0	0	1
Helena	0	0	------	0	1	0	0	0	0	0	0	0
Missoula	0	0	------	0	12	0	0	0	2	0	0	0
Idaho:												
Boise	0	0	------	0	6	0	0	0	3	0	0	0
Colorado:												
Denver	2	0	------	0	123	0	5	0	18	0	0	17
Pueblo	0	0	------	0	3	1	3	0	3	0	0	------
Utah:												
Salt Lake City	0	0	------	0	8	0	0	0	23	0	0	4

City reports for week ended May 6, 1944—Continued

	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
PACIFIC												
Washington:												
Seattle	1	0		1	46	0	6	0	61	0	0	3
Spokane	0	0		0	66	1	3	0	17	0	1	0
Tacoma	1	0		0	17	0	1	0	33	0	0	0
California:												
Los Angeles	11	0	4	0	449	4	3	2	30	0	0	6
Sacramento	1	0		0	100	1	1	0	7	0	0	2
San Francisco	0	0	2	0	228	2	7	0	57	0	1	11
Total 87 cities	59	3	41	16	5,821	167	388	4	2,245	0	11	291
Corresponding week, 1943	68	3	85	29	9,422	257	470	8	1,515	2	10	1,157
Average, 1939-43	67		109	[1] 25	[2] 6,134		[1] 377		1,528	4	16	1,193

[1] 3-year average, 1941-43.
[2] 5-year median.

Dysentery, amebic.—Cases: Boston, 1; Detroit, 1; Birmingham, 1; Mobile, 1.
Dysentery, bacillary.—Cases: Providence, 1; Buffalo, 1; New York, 3; Detroit, 1; Charleston, S. C., 3, Los Angeles, 2.
Dysentery, unspecified.—Cases: San Antonio, 20.
Typhus fever.—Cases: Savannah, 3; Tampa, 5; New Orleans, 2; Dallas, 1.

Rates (annual basis) per 100,000 population, by geographic groups, for the 87 cities in the preceding table (estimated population, 1943, 34,375,900)

	Diphtheria case rates	Encephalitis, infectious, case rates	Influenza		Measles case rates	Meningitis, meningococcus, case rates	Pneumonia death rates	Poliomyelitis case rates	Scarlet fever case rates	Smallpox case rates	Typhoid and paratyphoid fever case rates	Whooping cough case rates
			Case rates	Death rates								
New England	5.2	2.6		0.0	1,171	31.2	109.3	0.0	515	0.0	0.0	75
Middle Atlantic	6.8	0.5	3.2	1.8	577	27.6	64.5	0.5	260	0.0	0.9	30
East North Central	3.7	0.6	4.9	4.3	672	29.9	38.4	0.0	401	0.0	0.6	44
West North Central	10.0	0.0	4.0	2.0	1,556	27.9	87.8	0.0	433	0.0	4.0	42
South Atlantic	15.2	0.0	11.9	0.0	1,442	23.7	47.4	0.0	523	0.0	1.7	69
East South Central	0.0	0.0	17.5	0.0	151	17.5	64.1	0.0	157	0.0	0.0	52
West South Central	17.0	0.0	22.7	8.5	701	14.2	76.7	2.8	40	0.0	8.5	28
Mountain	15.8	0.0		0.0	1,489	7.9	87.1	0.0	396	0.0	0.0	174
Pacific	23.1	0.0	9.9	1.6	1,494	13.6	34.6	3.3	338	0.0	3.3	36
Total	9.0	0.5	6.2	2.4	885	25.4	59.0	0.6	342	0.0	1.7	45

PLAGUE INFECTION IN MONTEREY COUNTY, CALIF.

Plague infection has been reported proved in a pool of 284 fleas from 14 ground squirrels, *C. beecheyi*, collected on March 27, 1944, from a ranch 10 miles south and 14 miles east of Monterey, Monterey County, Calif.

TERRITORIES AND POSSESSIONS

Puerto Rico

Notifiable diseases—4 weeks ended April 22, 1944.—During the 4 weeks ended April 22, 1944, cases of certain notifiable diseases were reported in Puerto Rico as follows:

Disease	Cases	Disease	Cases
Chickenpox	67	Mumps	4
Diphtheria	35	Syphilis	1,035
Dysentery	14	Tetanus	6
Filariasis	9	Tetanus, infantile	3
Gonorrhea	616	Tuberculosis (all forms)	592
Influenza	89	Typhoid fever	22
Lymphogranuloma inguinale	4	Typhus fever	13
Malaria	918	Undulant fever	1
Measles	7	Whooping cough	63

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—Week ended April 22, 1944.—During the week ended April 22, 1944, cases of certain communicable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox		29	3	153	338	46	31	76	229	905
Diphtheria		3	2	23		2			1	31
Dysentery (bacillary)				9						9
German measles		27		144	140	14	42	7	51	425
Influenza		5			15		9		4	33
Measles		5	14	1,021	707	411	73	196	39	2,466
Meningitis, meningococcus				1	3			1		5
Mumps		24		142	212	39	9	67	48	541
Poliomyelitis									1	1
Scarlet fever		14	12	73	228	65	27	97	77	593
Tuberculosis (all forms)		3		260	78	13		10	56	420
Typhoid and paratyphoid fever				20		1	3	6		30
Undulant fever				1	3					4
Whooping cough		9		79	29	9	4	17	25	172

CHILE

Vital statistics—Year 1943.—The following table gives the provisional vital statistics for Chile for the year 1943:

	Number	Rate per 100,000 population
Births	211,552	[1] 39.7
Deaths	101,959	[1] 19.1
Infant mortality	32,855	[2] 155.3
Stillbirths	7,757	[2] 35.4
Deaths from:		
Anthrax	89	1.7
Diphtheria	213	4.0
Measles	125	2.3
Meningitis, meningococcus	505	9.5
Poliomyelitis	7	
Scarlet fever	12	
Tuberculosis	12,212	229.2
Typhoid and paratyphoid fever	441	8.3
Typhus fever	74	1.4
Whooping cough	1,117	21.0

NOTE.—Population, 5,327,335.

[1] Per 1,000 population.
[2] Per 1,000 births.

CUBA

Habana—Communicable diseases—4 weeks ended April 29, 1944.—During the 4 weeks ended April 29, 1944, certain communicable diseases were reported in Habana, Cuba, as follows:

Disease	Cases	Deaths	Disease	Cases	Deaths
Diphtheria	25	1	Scarlet fever	1	1
Malaria	1		Tuberculosis	8	1
Measles	27		Typhoid fever	43	11

WORLD DISTRIBUTION OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER

From medical officers of the Public Health Service, American consuls, International Office of Public Health, Pan American Sanitary Bureau, health section of the League of Nations, and other sources. The reports contained in the following tables must not be considered as complete or final as regards either the list of countries included or the figures for the particular countries for which reports are given.

CHOLERA

[C indicates cases]

NOTE.—Since many of the figures in the following tables are from weekly reports, the accumulated totals are for approximate dates.

Place		January-February 1944	March 1944	April 1944—week ended—				
				1	8	15	22	29
ASIA								
Ceylon	C	2						
India	C	33,667	9,109					
Calcutta	C	389	336	71	92	92		
Chittagong	C	60	3					
Madras	C	36						
Negapatam	C	15	2					

PLAGUE

[C indicates cases; D, deaths; P, present]

Place		January-February 1944	March 1944	April 1944—week ended— 1	8	15	22	29
AFRICA								
Belgian Congo	C	3						
Plague-infected rats		P						
British East Africa:								
Kenya	C	1						
Uganda	C		3	1				
Egypt	C	115	9		11	20	36	
Port Said	C	1					2	2
Suez	C	108	9	1	1	7	10	4
French West Africa: Dakar	C						[1] 1	
Madagascar	C	3						
Morocco (French)	C	19	1		1			
Rhodesia, northern	C	1						
Union of South Africa	C	20	3					
ASIA								
China: Foochow	C		P					
India	C	2,835	1,975					
Indochina	C	10	7					
Palestine	C	1						
SOUTH AMERICA								
Bolivia: Chuquisaca Department	C		4					
Ecuador: Chimborazo Department	C	1						
OCEANIA								
Hawaii Territory:								
Hamakua District	D	[2] 3	1					
Plague-infected rats [3]		[4] 25	[5] 8		5	[6] 3		

[1] 2 cases of suspected plague were also reported.
[2] Includes 1 death from pneumonic plague.
[3] 53 fleas were proved positive for plague on Mar. 7,1
[4] Includes 6 plague-infected mice.
[5] Includes 5 plague-infected mice.
[6] Includes 1 plague-infected mouse.

SMALLPOX

[C indicates cases; D, deaths; P, present]

Place		January-February 1944	March 1944	April 1944—week ended—				
				1	8	15	22	29
AFRICA								
Algeria	C	263	101					
Angola	C	20						
Basutoland	C	31						
Bechuanaland	C	7						
Belgian Congo	C	560	187	30	71			
British East Africa:								
Kenya	C	1,346	488	95	60			
Mombasa	C	56	39	10	5	9	1	
Tanganyika	C	285	98					
Uganda	C	498	402	180	170			
Cameroon (French)	C		190					
Dahomey	C	8	12		8			
Egypt	C	2,031	2,737	557	679			
French Equatorial Africa	C	60						
French Guinea	C	134	64		19			
Gambia	C		13					
Gold Coast	C	4	1					
Ivory Coast	C	196	59		7			
Morocco (French)	C	423	99					
Mozambique	C	1						
Nigeria	C	678	970	124				
Niger Territory	C	303	88		9			
Senegal	C	12	47		6			
Sudan (French)	C	888	279		264			
Tunisia	C	5					*	
Union of South Africa	C	16	10	1				
ASIA								
Arabia	C	[1] 7						
Ceylon	C	6	1	1				
China: Kunming [2]	C		7	5	1	2	5	
India	C	61,354	41,466					
Indochina	C	827	163		151			
Iran	C	1						
Iraq	C	22						
Palestine	C	4				6	23	20
Syria and Lebanon	C	71	51	5	16	3		
EUROPE								
Gibraltar	C	P						
Great Britain: London	C		[3] 12					
Portugal	C	8	1			1		
Spain	C	7	35	7	6	2	6	
Turkey	C	4,117						
NORTH AMERICA								
Honduras	C	4	2					
Mexico	C	665	243					
SOUTH AMERICA								
Bolivia	C	47	38					
Brazil	C	2	4	2		5		
Colombia	C	50	27					
Peru: Lima	C	19						
Venezuela	C	18	30					

[1] Includes 4 imported cases.
[2] Yunnan Fu.
[3] Includes 1 case imported from the Middle East.

TYPHUS FEVER

[C indicates cases; D, deaths; P, present]

Place		January-February 1944	March 1944	April 1944—week ended— 1	8	15	22	29
AFRICA								
Algeria	C	210	93					
Basutoland	C	P						
Belgian Congo	C	4		1				
British East Africa:								
Kenya	C	3	1	1				
Egypt	C	3,053		750				
French West Africa: Dakar	C	2	2					
Morocco (French)	C	446	305					
Morocco (Spanish)	C	1	4					
Mozambique	C	2						
Nigeria	C		1					
Rhodesia, northern	C	5	1					
Tunisia	C	142	96		59			
Union of South Africa	C	2,496	405					
ASIA								
Arabia: Western Aden Protectorate	C	[1] 15						
China: Kunming [2]	C		4	4	4	4	6	
India	C	2	1					
Iran	C	[3] 450	264					
Iraq	C	24	107	15	41	52		
Palestine	C	99	102					
Syria and Lebanon	C	28	101	53	57	32	53	19
Trans-Jordan	C	24						
EUROPE								
Bulgaria	C	293						
France	C		3					
Hungary	C	442	323	151	80	149	187	
Irish Free State	C			1				
Netherlands	C	7						
Portugal	C		1					
Rumania	C	3,409	1,649					
Slovakia	C	152	44					
Spain	C	38	67		[4] 123		21	
Turkey	C	524						
Yugoslavia	C	273	[5] 1,465					
NORTH AMERICA [6]								
Guatemala	C	317	280					
Jamaica	C		1	1	1			
Mexico	C	432	182					
Puerto Rico	C	11	6	2	2	2	7	3
Salvador	C		2					
Virgin Islands	C	1						
SOUTH AMERICA								
Bolivia	C	5	16					
Chile	C	71						
Curacao	C	1						
Ecuador	C	53	48					
Peru	C	1						
Venezuela	C	12	6					
OCEANIA								
Australia	C	24	25					
Hawaii Territory	C	16	6					

[1] A report dated Mar. 30, 1944, states that an estimated 800 deaths from typhus fever have occurred.
[2] Yunnan Fu.
[3] Approximated.
[4] For 2 weeks.
[5] For the period Feb. 1 to Mar. 21, 1944.
[6] Cases of typhus fever listed in this area are probably of endemic type.

YELLOW FEVER

[C indicates cases; D, deaths]

Place		January-February 1944	March 1944	April 1944—week ended—				
				1	8	15	22	29
AFRICA								
Belgian Congo:								
Babeyru	D	1						
Leopoldville	C		1					
Gold Coast: Tamale	C	[1] 1						
EUROPE								
Portugal: Lisbon.[2]								
SOUTH AMERICA								
Brazil:								
Acre Territory	D	1						
Matto Grosso State	D	3						

[1] Suspected.
[2] According to information dated Jan. 21, 1944, it is reported that a vessel which called at the islands of Sao Tome and Cape Verde arrived at Lisbon, Portugal, with cases of yellow fever on board.

×

FEDERAL SECURITY AGENCY

UNITED STATES PUBLIC HEALTH SERVICE

THOMAS PARRAN, *Surgeon General*

DIVISION OF PUBLIC HEALTH METHODS

G. ST. J. PERROTT, *Chief of Division*

The PUBLIC HEALTH REPORTS, first published in 1878 under authority of an act of Congress of April 29 of that year, is issued weekly by the United States Public Health Service through the Division of Public Health Methods, pursuant to the following authority of law: United States Code, title 42, sections 7, 30, 93; title 44, section 220.

It contains (1) current information regarding the prevalence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

The PUBLIC HEALTH REPORTS is published primarily for distribution, in accordance with the law, to health officers, members of boards or departments of health, and other persons directly or indirectly engaged in public health work. Articles of special interest are issued as reprints or as supplements, in which forms they are made available for more economical and general distribution.

Requests for and communications regarding the PUBLIC HEALTH REPORTS, reprints, or supplements should be addressed to the Surgeon General, United States Public Health Service, Washington, D. C. Subscribers should remit direct to the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D.C.

Librarians and others should preserve their copies for binding, as the Public Health Service is unable to supply the general demand for bound copies. Indexes will be supplied upon request.

UNITED STATES GOVERNMENT PRINTING OFFICE, WASHINGTON : 1944

For sale by the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C.

Price 5 cents. Subscription price $2.50 a year

Public Health Reports

VOLUME 59 **JUNE 2, 1944** NUMBER 22

IN THIS ISSUE

A Survey of Typhus Fever in California

Poliomyelitis in the United States, 1943

CONTENTS

Public Health Reports

Vol. 59 • JUNE 2, 1944 • No. 22

A STRAIN OF TYPHUS RICKETTSIAE ISOLATED FROM THE BRAIN OF A WILD RAT IN CALIFORNIA[1]

By M. Dorthy Beck, Howard L. Bodily,[2] and Rosemary O'Donnell

INTRODUCTION

Typhus fever was not recognized clinically in California prior to 1916 according to a publication by Cumming and Senftner (*1*). Since that time an increasing number of cases have been reported to the California State Department of Public Health, the total to October 1, 1943, being 278. Of these, 129 have occurred in the last 5 years. Endemic foci of infection have been confined almost exclusively within the geographical limits of southern California, mainly in Los Angeles and San Diego Counties. However, there is recorded a group of 26 cases with 1 death in 1916 among Mexican railroad section gangs. The infection was believed to have been louse borne and imported from Mexico. Blood from three of these patients when inoculated into guinea pigs produced a mild disease with temperatures only after 10 to 12 days' incubation (*1*). Four passages were made but no further laboratory work was done to identify the etiological agent. From the description given it is probable that these were nonorchitic strains. The history of the infection in California has never recorded a repetition of the 1916 outbreak and epidemiologically since that year the disease has been considered to be flea borne. The following report presents preliminary field and laboratory studies in connection with a survey of typhus fever in California.

LABORATORY STUDIES

Field work.—Field studies were initiated in March 1943 in San Bernardino County following the report of a laboratory diagnosed case (Weil-Felix positive 1–5120) of typhus fever with onset in February. The patient, M. B. H., was employed as an egg packer in a poultry plant located in a semirural district where she had worked

[1] The studies and observations on which this paper is based were conducted by the Virus Unit, Division of Laboratories, and the Bureau of Epidemiology, California State Department of Public Health. The Virus Unit is financed in part by a grant from the International Health Division of the Rockefeller Foundation.

[2] Associate Bacteriologist, United States Public Health Service, assigned to the California State Department of Public Health.

from September 1942 until February 24, 1943. Rats and mice were reported as being numerous around the building. Ample opportunity was afforded for the rodents to gain access to the 6- to 7-inch space beneath the floor of the "feather" room located on the second floor of the main building. Furthermore, a large section of plaster was missing from the ceiling of the women's rest room directly below making it possible for fleas to drop onto a cot which had been used by the patient on several occasions. M. B. H. remarked that she had been bitten but was not sure that the bites were caused by fleas. The epidemiological history in this case indicated that the poultry plant was a probable source of infection and an investigation followed.

A mobile laboratory unit was used which was equipped for trapping, autopsying of animals, and the inoculation of guinea pigs. Cage traps were placed in and around the main building where M. B. H. had worked and in the smaller adjacent units. A total of 21 mice (*Mus musculus musculus*), 3 rats (*R. rattus alexandrinus*), and 3 pools of fleas was collected.

Method of examination.—Only specimens from live animals were used for inoculation. The animals were chloroformed, combed for fleas, and the brains removed aseptically. One-half of each rodent's brain was thoroughly ground in a mortar and made up to approximately a 10 percent suspension with infusion broth (pH 7.2). The suspension was allowed to settle to remove the coarse particles and 3 to 4 cc. of each were inoculated intraperitoneally into one or two male guinea pigs. The other half of each brain was stored in a portable dry-ice box for subsequent examination. Pools were made of the mouse brains and also of the fleas, but the rat brains were injected separately. The guinea pigs inoculated with field specimens were shipped immediately by express to the central laboratory in Berkeley for observation.

Isolation of a strain.—The inoculated guinea pigs were observed daily for 21 days for rise of temperature and appearance of scrotal involvement. Field specimen No. 10 from a rat trapped in the "feather" room on the second floor of the main poultry plant was inoculated into two male guinea pigs, Nos. 817 and 825. Guinea pig No. 817 showed a rise of temperature (104°) on the eleventh and twelfth days with slight scrotal swelling on the latter day. Temperature and swelling of the scrotum subsided on the thirteenth day. This animal was tested for immunity and will be referred to later. Guinea pig No. 825 had a temperature of 104.5° on the eighth day, 103.8° on the ninth day, 105° on the tenth day with scrotal swelling. On the eleventh day the temperature was 104.5° with swollen and adherent testes; the animal was sacrificed.

Blood and testicular washings were passed separately to two guinea pigs; all animals received 4 cc. intraperitoneally. This strain, which

will be designated as "825," has been maintained through 25 serial passages over a period of 5 months. Fleas from the rat found positive for typhus when injected into guinea pigs failed to produce the infection as judged by lack of clinical symptoms and immunity to a known endemic strain of typhus. The remaining field specimens were negative for typhus rickettsiae. The newly isolated strain was compared with endemic and epidemic typhus fever strains supplied by Dr. R. R. Parker, United States Public Health Service.

PATHOGENICITY TESTS IN ANIMALS

Guinea pigs.—After the initial passage of rat brain into guinea pigs, strain 825 has been transmitted with ease in this host, a total of 69 animals being used for routine passage. Two of these died with intercurrent infections 2 and 4 days after inoculation. The remaining 67 showed a typical rise in temperature and 64, or approximately 95 percent, developed scrotal involvement. The larger animals showed more pronounced scrotal reactions, an observation which has also been noted by Raynal (cited by Liu and Zia (*2*)). The animals exhibited no other clinical signs of illness and only two deaths occurred.

Autopsy findings were similar to those recorded in the literature (*3*, *4*) for endemic typhus strains in guinea pigs. Irregular findings were enlarged inguinal lymph glands and a deposit of fibrin on the surface of the spleen. Similar observations have also been noted by Lewthwaite and Savoor (*4*). Intracellular rickettsiae were quite easily demonstrated in the scrapings of the tunica vaginalis when stained by Machiavello's method or by Bengtson's (*5*) or Gracian's (*6*) modifications of Giemsa.

Animals selected for transfer were etherized and bled from the heart. The heart blood was routinely cultured in broth at the time of transfer and all cultures have proved sterile.

Blood, brain, and testicular washings have been used for passage material. Blood was passed on the fifth or sixth day, 4 cc. being injected intraperitoneally into normal male guinea pigs weighing at least 300 gm. When brain was used as inoculum the animal was sacrificed on the fourteenth or fifteenth day following inoculation. The tissue was ground in a sterile mortar and made up to approximately 10 percent suspension in saline; 3 to 4 cc. were given intraperitoneally to each of two normal guinea pigs. Testicular washings have been employed for routine passage applying Maxcy's (*7*) technique. The infected guinea pigs were killed on the fifth or sixth day after inoculation or 48 to 72 hours from the development of the temperature.

The incubation time for the original animal (825) was 8 days. This, however, was reduced to 3 days on the second passage and has remained almost constant when testicular washings were used as inoculum. On the third day following inoculation the animals showed

a sharp rise in temperature which frequently declined on the fourth day and rose again on the fifth day. The incubation period for blood averaged 7 days and for brain material the incubation period was 8 days with 11 days as maximum for the latter. Maxcy (*7*) noted longer incubation periods with his strains of endemic typhus when blood was employed for passage. The scrotal involvement closely followed the temperature rise and appeared either on the same day or a day later. Testicular washings produced a more persistent reaction lasting approximately 4 days.

Rabbits.—Two rabbits were inoculated intraperitoneally with 3 cc. of testicular washings from a guinea pig showing typical symptoms of temperature and scrotal involvement. Temperatures were taken on one animal for 14 days but no rise was observed over this period nor were any clinical symptoms noted in either of the rabbits. The animals were bled before and 14 days after inoculation. Agglutination tests with four strains of proteus were done and table 1 gives the results. The agglutinins were of the OX19 type.

TABLE 1.—*Agglutination tests with strains of* B. proteus

Rabbit No.	Day of bleeding	Proteus strains			
		OX19	OX2	OXK	XLL[1]
12	0	0	0	0	0
	14	+1-40	0	0	±1-20
17	0	0	0	0	0
	14	+++1-320	0	0	+++1-640
		++1-640			++1-1280

[1] Strain XLL came originally from Dr. R. R. Parker, United States Public Health Service.

A number of workers (*8, 9*) have observed that the response of rabbits, as demonstrated by the production of agglutinins, varied considerably; this variation was evinced from the difference in titer developed by the two rabbits receiving strain 825.

White rats.—Strain 825 passed to white rats by the intraperitoneal route produced inapparent infections. Serial transfers were made using brain as the source of rickettsiae. After two passages, rats Nos. 9 and 10 were sacrificed at 16 days and the brains inoculated intraperitoneally into guinea pigs. Typical temperature and scrotal reactions developed. These rats were bled and their blood tested for agglutinins. The results are shown in table 2.

TABLE 2.—*Agglutination tests with strains of* B. proteus

Rat No.	Day of bleeding	Proteus strains			
		OX19	OX2	OXK	XLL[1]
9	16	±1-20	0	±1-10	±1-80
10	16	±1-160	±1-10	±1-10	++++1-160

[1] [illegible] Service.

Cotton rats.—Snyder and Anderson (*10*) reported that epidemic strains of typhus may be passed in very young cotton rats (*Sigmodon hispidus hispidus*) by the intracardial route resulting in a fatal infection. According to Varela (*11*) and Brigham (*12*) endemic strains have no effect on these rodents. Applying the technique of Snyder and Anderson eight young cotton rats, 4 to 6 weeks old, were given 0.2 cc. of testicular washings from a guinea pig infected with strain 825. Inapparent infections were the rule in this series; however, the brains from two of these animals were removed 24 days after inoculation and they produced typical symptoms in two normal guinea pigs in 7 and 9 days. Like the rat this species evidently carries the infection over a period of time without clinical symptoms and may be of epidemiological importance as a reservoir of typhus fever.

Mice.—Another difference between endemic and epidemic strains is emphasized by the use of white mice as experimental animals. Epidemic strains as reported in the literature (*13*, *14*, *15*, *16*, *17*) are lost after three transfers, whereas endemic strains may be passed repeatedly in mice by intraperitoneal inoculation of mouse brains at 10-day intervals.

Strain 825 was passed serially in mice and at the third, fifth, and ninth transfers guinea pigs were also injected. Characteristic reactions developed. These animals subsequently were found to be immune to the known strain of endemic typhus.

Liu and Zia (*2*) in their studies on typhus fever in China reported fatalities among the inoculated mice. Deaths were observed also among mice infected with strain 825 and at autopsy exhibited only a sticky peritoneal exudate.

Developing eggs.—Cox (*18, 19*) has successfully established the rickettsiae of typhus fever in the yolk sacs of developing eggs. Strain 825 was readily adapted by the inoculation of testicular washings into the yolk sacs of 5-day-old fertile eggs. After 6 days' incubation some of the embryos from the initial inoculation died. Yolk sacs from the remaining live embryos were harvested and passed. Subsequent transfers proved fatal to the embryos in most instances in 5 to 6 days.

Yolk sac material from the fourth egg passage was ground in a mortar, diluted with saline, and injected intraperitoneally into male guinea pigs as well as eggs. The animals gave characteristic reactions and were immune to reinoculation with the known endemic strain. Numerous free rickettsiae were demonstrable in smears of the infected yolk sac as described by Bengtson (*5*).

Pathology.—Sections were made of the brains of five guinea pigs, showing typical temperature and scrotal reactions, autopsied on the fifteenth day after inoculation. According to Dr. J. F. Rinehart, University of California Medical School, only two showed the characteristic brain lesions of typhus fever. A third had one lesion of uncer-

tain character. Various workers (*9, 20, 21*) have stated that the lesions are difficult to find in the brains of guinea pigs inoculated with endemic strains and that the time of obtaining the specimen and the sections of tissue examined are important factors.

Preservation of the rickettsiae.—From the standpoint of field surveys it was important to know if specimens would retain their infectivity after being stored at −70° C. One-half of all field specimens were frozen with dry ice, the plan being to reinoculate any material from which rickettsiae had been isolated in the original. The frozen half of field specimen No. 10 from which strain 825 was obtained was kept for 2 weeks at −70° C. and then ground up and two normal guinea pigs inoculated.

After 7 and 12 days' incubation, temperature and scrotal swelling developed. This strain was carried for three passages and then discontinued. The results indicate that field specimens may be successfully preserved at −70° C. for at least 2 weeks. Experiments were done to determine if this time limit could be extended. It has been found that infected guinea pig brain sealed in pyrex tubes will remain viable for at least 2 months at −70° C., which is the longest period tested thus far.

Topping (*22*) suggests sterile skim milk as a diluent when typhus material is to be frozen and dried. This method has been used for testicular washings, brain and yolk sac passage material for strain 825 with good results.

Cross immunity tests.—As a final check on the identity of strain 825, cross immunity tests were done. Guinea pigs were given one intraperitoneal inoculation of the various strains; e. g., strain 825, endemic and epidemic, and were usually tested for immunity at the end of 14 days with the homologous and heterologous strains. Appropriate controls receiving the same test dose were included for each. Temperatures of all animals were taken daily for 21 days.

Figure 1 demonstrates the results of cross immunity tests using the United States Public Health Service endemic strain as the challenging agent. Guinea pig No. 817, as stated above, was inoculated in the field laboratory with the same material as No. 825, and tested 46 days later. Guinea pig No. 73 represents the second passage of the frozen brain from field specimen No. 10, and guinea pig No. 87 is the sixth passage of strain 825. These three animals were found to be solidly immune to known endemic typhus fever.

Figure 2 represents the cross immunity tests against the United States Public Health Service epidemic strain. Guinea pigs Nos. 112 and 164 inoculated with strain 825 were found to be completely protected against epidemic typhus fever. Figures 3 and 4 illustrate the cross immunity tests in guinea pigs inoculated with strain 825 and with known endemic and epidemic strains and tested with strain 825.

One of the original guinea pigs (No. B38528) inoculated with endemic typhus sent to us by the United States Public Health Service Laboratory at Hamilton, Mont., was included in this group. Homologous and heterologous immunity with strain 825 was demonstrated.

DISCUSSION

The experimental laboratory work on a strain of typhus rickettsiae isolated from a wild rat for the first time in California has been completed, fulfilling all the criteria set up by Dyer, Workmann, Badger, and Rumreich (*23*) for the identification of unknown endemic strains:

1. Typical febrile reactions and typical scrotal involvement in guinea pigs.
2. Negative blood cultures from guinea pigs at the height of their reactions.

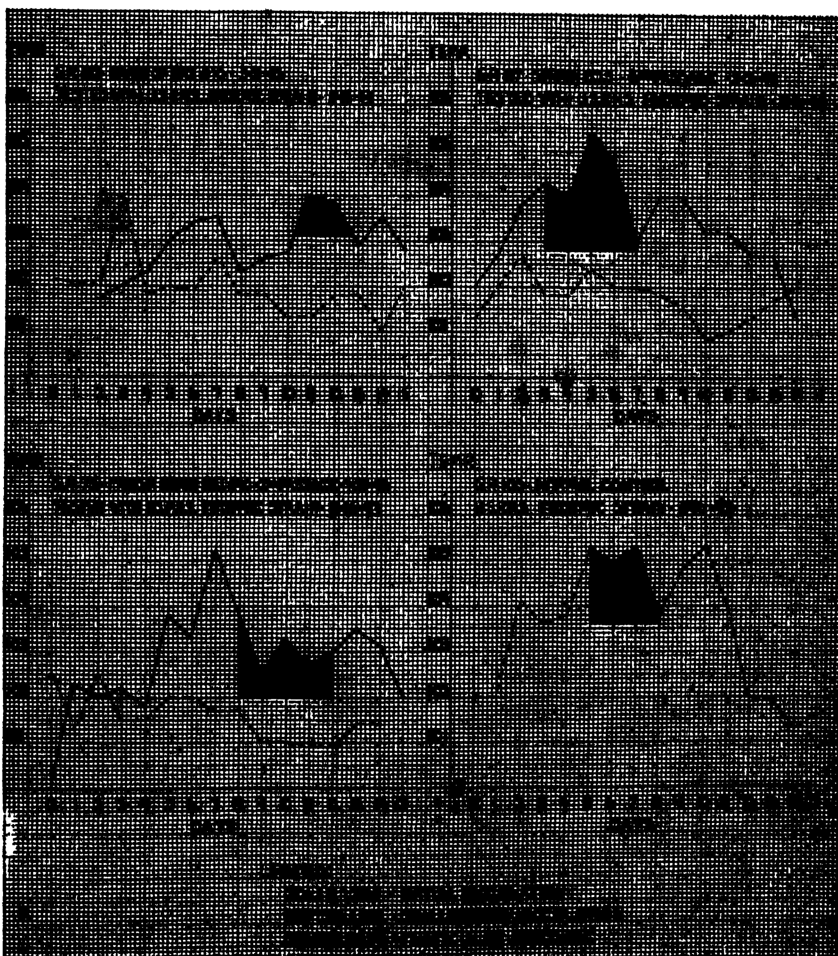


FIGURE 1.—Cross immunity tests with endemic typhus as the test strain.

3. Intracellular rickettsia in smears made from the tunica vaginalis of guinea pigs reacting typically.
4. The development in rabbits of agglutinins for *B. proteus* X19 type 0.
5. Typical histologic lesions in the brains of guinea pigs.
6. Clear-cut cross immunity between the unknown and known strains of typhus.

Epidemiologically the case history of M. B. H. corresponds to the observation of Dyer et al. (*24*) that endemic typhus is more closely associated with the place of employment than with the domicile, as the infected rat in this instance was trapped alive at the poultry plant where the patient worked.

It is apparent from the experimental and epidemiological evidence presented herein that the murine variety of typhus fever is present in at least one locality of the State. In view of the fact that the 1916

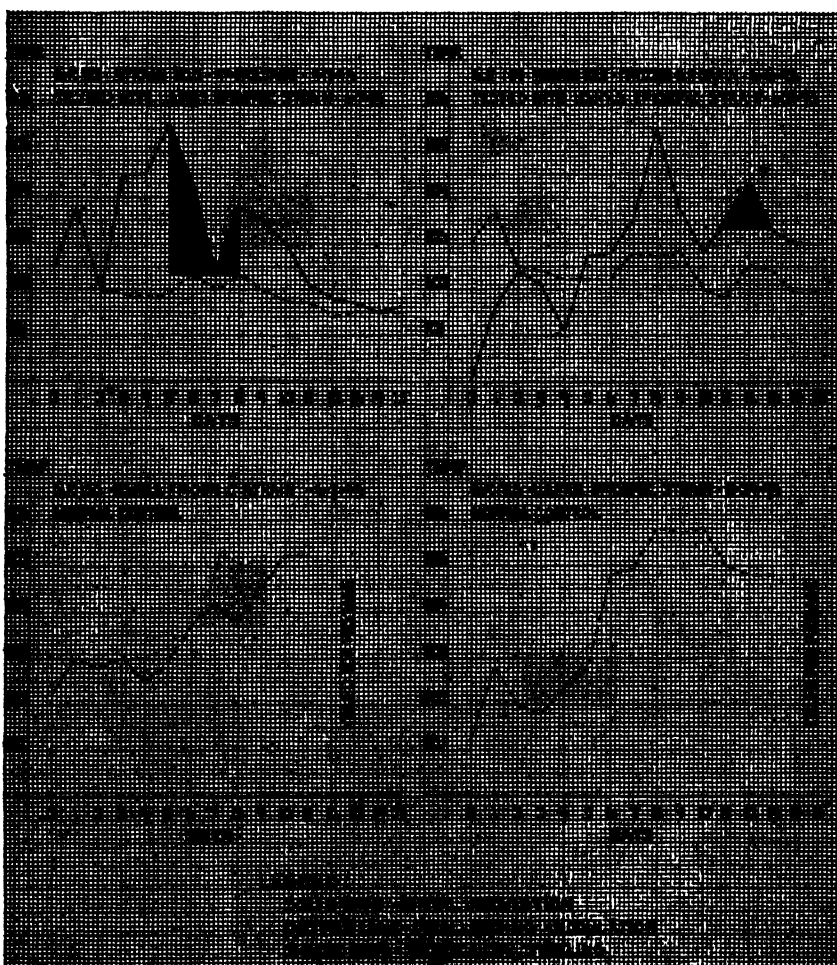


FIGURE 2.—Cross immunity tests with epidemic typhus as the test strain.

cases were considered to be louse borne, while subsequent infections have apparently been transmitted by fleas, a more extensive field survey will be necessary to completely establish the type or types of this disease in California.

SUMMARY

For the first time in California a strain of typhus rickettsiae has been isolated from the brain of a wild rat (*R. rattus alexandrinus*) associated with the place of employment of a laboratory diagnosed case of typhus fever.

Strain 825 fulfills the six criteria for the identification of endemic strains of typhus fever.

Typhus fever of the murine type was found to be present in the county surveyed.

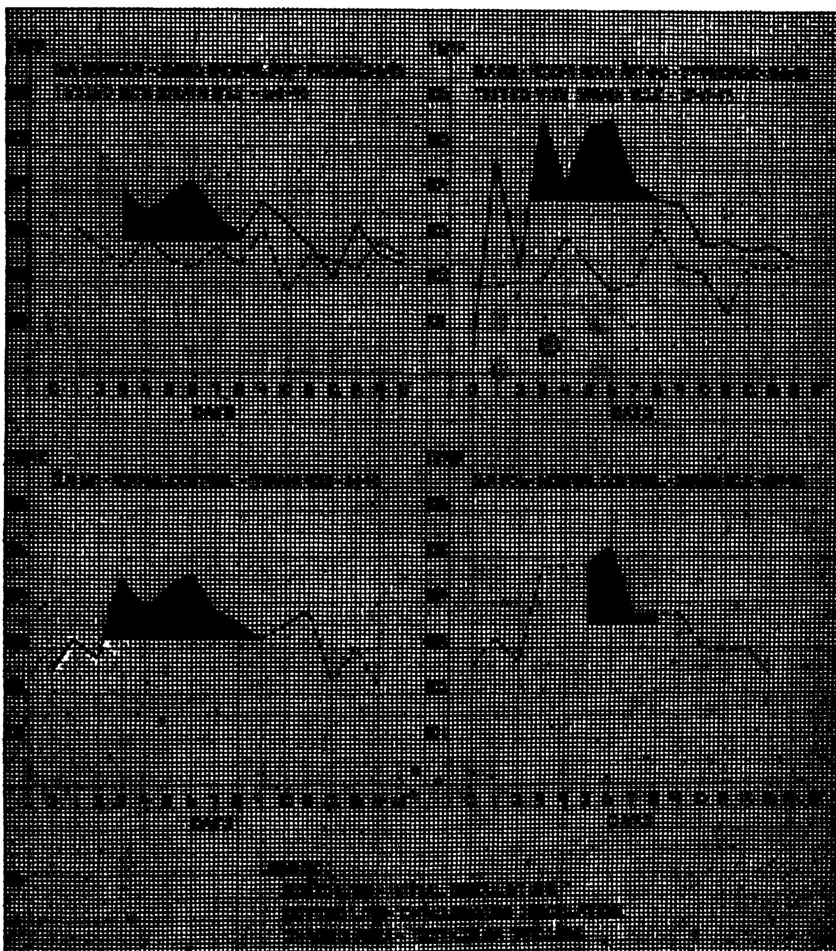


FIGURE 2.—Cross immunity tests with strain 825 as the test strain.

ACKNOWLEDGMENTS

The authors wish to acknowledge the assistance of Mr. E. T. Ross, Chief of the Bureau of Sanitary Inspection, California State Department of Public Health, and members of the Rodent Control Crew in conducting the field survey; Miss Marjorie Hunt, Division of Laboratories Virus Unit, California State Department of Public Health, for preparing the temperature charts; Dr. R. R. Parker of the United States Public Health Service for supplying the endemic and epidemic strains of typhus fever; Dr. J. F. Rinehart, California Medical School, Division of Pathology, for examining the pathological sections, and Dr. B. U. Eddie, Hooper Foundation for Medical Research, for supplying the strains of *B. proteus*.

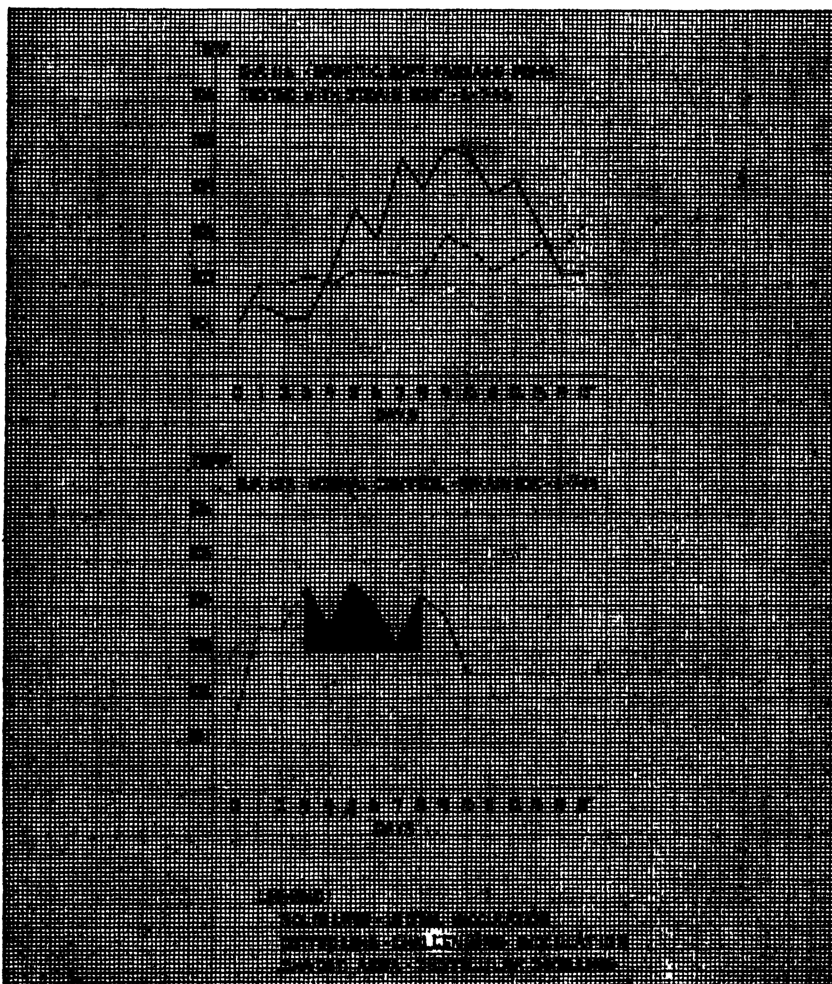


FIGURE 4.—Cross immunity tests with strain 825 as the test strain.

NOTE: Since this report was submitted for publication, field studies have been extended, and from the material collected nine specimens have been found positive for typhus rickettsiae: seven rat brains, one pool of fleas, and blood from a human case. Details of this survey will be published at a later date.

REFERENCES

(*1*) Cumming, J. G., and Senftner, H. F.: The prevention of endemic typhus in California. J. Am. Med. Assoc., **69**: 98–102 (1917).

(*2*) Liu, Wei-T'Ung, and Zia, Samuel H.: Studies on the murine origin of typhus epidemics in North China. 1. Murine typhus rickettsia isolated from body lice in the garments of a sporadic case. Am. J. Trop. Med., **21**: 507–523 (1941).

(*3*) Maxcy, K. F.: Endemic typhus fever of the southeastern United States: Reaction of the guinea pig. Pub. Health Rep., **44**: 589–600 (1929).

(*4*) Lewthwaite, R., and Savoor, S. R.: The typhus group of diseases in Malaya: Part IV. The isolation of two strains of tropical typhus from wild rats. Brit. J. Expt. Path., **17**: 208–214 (1936).

(*5*) Bengtson, Ida A.: Cultivation of the rickettsiae of endemic (murine) and epidemic (European) typhus fever in vitro. Pub. Health Rep., **52**: 1336–1340 (1937).

(*6*) Gracian, M.: Ein Einfaches verfahren zur Farbung der Rickettsien. Ztschr. f. Hyg. u. Infectionskr., **124**: 81–82 (1942).

(*7*) Maxcy, K. F.: Endemic typhus of the southeastern United States: The reaction of the white rat. Pub. Health Rep., **44**: 1935–1943 (1929).

(*8*) Lewthwaite, R., and Savoor, S. R.: The typhus group of diseases in Malaya: Part I. The study of the virus of rural typhus in laboratory animals. Part II. The study of the virus of Tsutsugamushi disease in laboratory animals. Brit. J. Expt. Path., **17**: 1–14, 15–22 (1936).

(*9*) Dyer, R. E., Workmann, W. G., and Rumreich, A. S.: Endemic typhus fever virus recovered from wild rat trapped at typhus focus in the United States. Pub. Health Rep., **47**: 2370–2372 (1932).

(*10*) Snyder, J. C., and Anderson, C. R.: The susceptibility of the eastern cotton rat, *Sigmodon hispidus hispidus*, to European typhus. Science, **95**: 23 (1942).

(*11*) Varela, B.: Medicinia (Mexico), **13**: 171 (1933). (Quoted by Snyder and Anderson (*10*)).

(*12*) Brigham, G. D.: Susceptibility of animals to endemic typhus fever. Pub. Health Rep., **52**: 660–662 (1937).

(*13*) Castaneda, M. R., and Silva, R.: Varieties of Mexican typhus strains. Pub. Health Rep., **54**: 1337–1345 (1939).

(*14*) Brigham, G. D.: Endemic typhus virus in mice. Pub. Health Rep., **53**: 1251–1256 (1938).

(*15*) Chung, H. L., and Tchang, J.: Studies on etiology of typhus fever in North China. Chinese Med. J., **53**: 513–538 (1938).

(*16*) Kligler, I. J., Aschner, M., and Levine, S.: Comparative studies of the louse-borne (epidemic) and flea-borne (murine) typhus viruses. Brit. J. Expt. Path., **17**: 53–60 (1936).

(*17*) Okamoto, Yutaka: Experimental studies on mice concerning typhus fever: 3. Mice passage of the virus of the epidemic typhus fever. Kitasato Archives of Expt. Med., **13**: 113–124 (1936).

(*18*) Cox, H. R.: Use of yolk sac of developing chick embryo as medium for growing rickettsiae of Rocky Mountain spotted fever and typhus groups. Pub. Health Rep., **53**: 2241–2247 (1938).

(*19*) Cox, H. R.: Cultivation of rickettsiae of Rocky Mountain spotted fever, typhus, and Q fever groups in the embryonic tissues of developing chicks. Science, **94**: 399–403 (1941).

(*20*) Lillie, R. D., Dyer, R. E., and Topping, N.: Cerebral pathology in rodents in endemic typhus and Rocky Mountain spotted fevers. Pub. Health Rep., **54**: 2137–2148 (1939).

(*21*) Lillie, R. D., and Dyer, R. E.: Brain reaction in guinea pigs infected with endemic typhus, epidemic typhus (European), and Rocky Mountain spotted fever, eastern and western types. Pub. Health Rep., **51**: 1293–1307 (1936).

(*22*) Topping, N. H.: The preservation of the infectious agents of some of the rickettsioses. Pub. Health Rep., **55**: 545–547 (1940).

(23) Dyer, R. E., Workmann, W. G., Badger, L. F., and Rumreich, A. S.: The experimental transmission of endemic typhus fever of the United States by the rat flea (*Ceratophyllus fasciatus*). Pub. Health Rep., 47: 931–950 (1932).

(24) Dyer, R. E., Ceder, E. T., Lillie, R. D., Rumreich, A. S., and Badger, L. F.: The experimental transmission of endemic typhus fever of the United States by the rat flea (*Xenopsylla cheopis*). Pub. Health Rep., 46: 2481–2499 (1931).

PREVALENCE OF POLIOMYELITIS IN THE UNITED STATES IN 1943

By C. C. Dauer, *Epidemiologist, District of Columbia Health Department*

The reported incidence of poliomyelitis in the United States during 1943 was higher than in any previous year for which data are available with the exception of two years, 1916 and 1931. In 1916, 27 States reported 27,363 cases, 43 States reported 15,790 cases in 1931, and 48 States reported 12,429 cases in 1943.[1] Other years in which more than 10,000 cases were recorded were 1927 with 10,533 and 1935 with 10,839 cases. A very low incidence, 4,033 cases, was recorded in 1942.

As pointed out in a previous report [2] certain counties in Texas and California had a relatively high incidence of poliomyelitis late in 1942. As in other years this occurrence of the disease late in the fall and early winter of 1942 was a forerunner of a more widespread epidemic in these States in 1943. A number of counties involved in this late appearance of the disease in 1942 contained large cities which also experienced high rates of incidence. From January to April 1943, inclusive, these cities and counties reported small numbers of cases and a sharp increase became apparent late in May in California, principally in Los Angeles, and early in June in the Texas counties. The disease subsequently occurred in epidemic form throughout various parts of these two States as shown in the accompaning map (fig. 1). A total of 2,685 cases of poliomyelitis was reported in California during 1943 and 1,271 in Texas, or about 32 percent of the total for the entire United States. The morbidity rates per 100,000 population were 38.8 in California and 19.8 in Texas.

As shown in figure 1 and table 1, poliomyelitis was widespread throughout the entire southwestern part of the country and along the Pacific coast region. In the eastern half of the United States there was a comparatively low rate of incidence except in certain localized areas.

Two States, Utah and Kansas, experienced even higher rates of incidence than California. In Utah where 399 cases were reported, or a rate of 72.7 per 100,000 population, the disease first appeared in the latter part of July and the peak in incidence was reached in September.

[1] All data for 1943 in this report are provisional.

[2] Dauer, C. C.: Poliomyelitis in the United States in 1942. Pub. Health Rep., 58: 937 (1943).

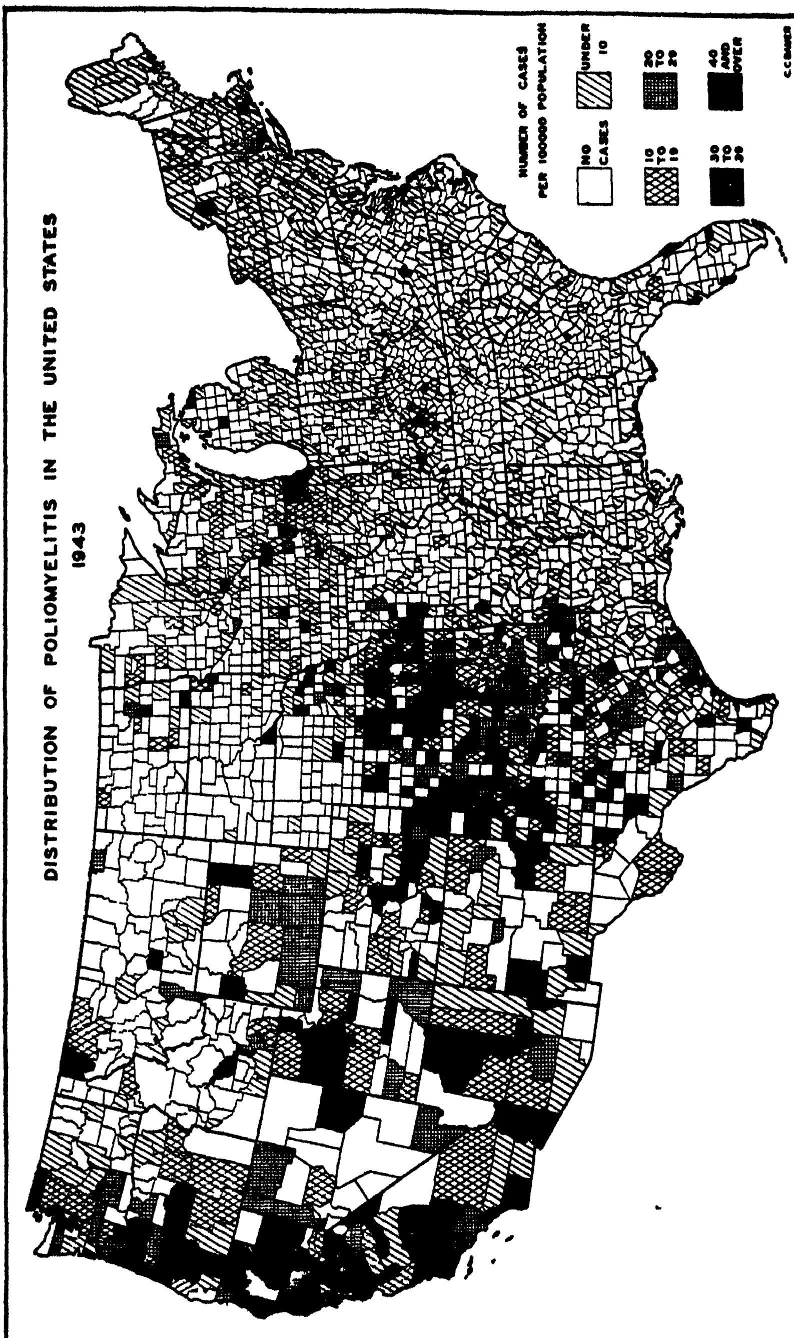

DISTRIBUTION OF POLIOMYELITIS IN THE UNITED STATES
1943
NUMBER OF CASES PER 100000 POPULATION
NO CASES
UNDER 10
10 TO 19
20 TO 29
30 TO 39
40 AND OVER

FIGURE 1.

In Kansas there were 764 cases, or a rate of 42.4. A number of counties in the western part of the State had reported localized outbreaks in 1942 but in 1943 the disease was prevalent throughout the State, especially in the central part. No longer ago than 1940, a fairly widespread outbreak occurred when the disease was more prevalent in the central and eastern sections. A few counties reported high rates of incidence both in 1940 and 1943 but the two outbreaks generally involved different counties.

On the Pacific coast, Oregon and Washington also reported a high incidence of poliomyelitis. Oregon had a rate of 37.1 (405 cases) but

TABLE 1.—*Poliomyelitis morbidity rates per 100,000 population by States, 1940–43*

	1940	1941	1942	1943
United States	7.4	6.8	3.2	9.5
New England:				
Maine	1.3	4.8	5.1	2.0
New Hampshire	.4	6.3	2.3	2.6
Vermont	1.7	3.9	9.1	7.2
Massachusetts	1.0	4.2	.9	5.9
Rhode Island	1.2	5.2	.7	26.1
Connecticut	1.1	6.7	2.8	22.1
Middle Atlantic:				
New York	1.6	8.2	2.1	5.1
New Jersey	1.5	8.4	6.1	2.0
Pennsylvania	1.7	7.4	1.2	1.4
East North Central:				
Ohio	9.5	7.0	2.3	2.7
Indiana	19.9	3.4	2.9	3.1
Illinois	7.6	4.8	6.2	19.9
Michigan	23.0	5.1	3.1	2.6
Wisconsin	15.7	3.1	1.4	6.6
West North Central:				
Minnesota	8.4	10.1	2.9	6.1
Iowa	36.9	1.7	2.9	8.0
Missouri	8.3	1.1	2.3	5.8
North Dakota	3.9	2.6	2.8	3.4
South Dakota	12.7	4.3	2.2	2.6
Nebraska	14.0	1.0	10.7	10.6
Kansas	30.1	2.7	6.1	42.4
South Atlantic:				
Delaware	.8	1.0	6.3	2.6
Maryland	.9	13.1	.8	1.2
District of Columbia	1.2	10.1	.6	1.4
Virginia	9.3	5.9	1.8	2.3
West Virginia	34.8	2.5	2.6	1.6
North Carolina	2.1	4.7	2.2	1.0
South Carolina	1.0	8.7	3.5	1.0
Georgia	.9	23.5	1.8	.9
Florida	1.7	14.4	2.2	1.5
East South Central:				
Kentucky	7.8	7.7	4.8	5.5
Tennessee	1.9	18.4	5.3	.6
Alabama	1.9	30.5	2.6	1.4
Mississippi	2.0	6.9	2.7	1.5
West South Central:				
Arkansas	1.5	3.0	7.8	4.0
Louisiana	5.5	2.9	2.4	2.9
Oklahoma	4.9	2.1	.7	24.2
Texas	2.7	2.0	3.8	19.8
Mountain:				
Indiana	19.1	5.3	2.7	4.8
Idaho	13.0	1.9	1.1	2.8
Wyoming	16.3	4.7	6.0	13.1
Colorado	3.5	2.5	3.3	25.7
New Mexico	4.3	1.9	5.1	14.4
Arizona	1.4	3.0	6.8	18.0
Utah	11.3	7.4	5.0	72.7
Nevada	1.0	0	2.7	19.1
Pacific:				
Washington	24.6	4.1	1.8	20.0
Oregon	5.8	7.5	2.5	37.1
California	16.6	6.7	5.1	38.8

over half of the cases occurred in two counties, Lane County with 126 cases (182.3 per 100,000) and Multnomah with 96 cases (27.2 per 100,000). The disease appeared rather abruptly late in July and the peak was reached in October. In Washington State where there were 348 cases, or a rate of 20.0, the disease began to appear at the same time as in Oregon and reached its height at approximately the same time.

In Oklahoma poliomyelitis cases began to be reported late in June and increased rapidly in number until the first week of August. About the same time cases began to be reported in fairly large numbers in Kansas and Colorado. In Arizona small numbers of cases were noted throughout the spring and summer of 1943 but never in excessively large numbers. Likewise in New Mexico and Nevada the disease was reported regularly in small numbers during the late summer months.

A severe outbreak of poliomyelitis occurred in Chicago and Cook County as well as the nearby counties of northeastern Illinois which represented nine-tenths of all the cases reported in the State during 1943. Of the 1,575 cases reported for the State as a whole, 1,053, or 65 percent, occurred in Chicago. In Connecticut 228, or 60 percent of the 379 cases occurring in the State, were reported from New Haven County. In Rhode Island poliomyelitis was concentrated in and near Providence, and moderate increases in prevalence were reported in Bristol and Essex Counties in Massachusetts. Only a few small localized outbreaks occurred in other parts of the country in which one or more counties were involved. These occurred mainly in Kentucky, Wisconsin, Minnesota, Nebraska, and Wyoming. The South Atlantic and East South Central States, with the exception of Kentucky, reported a very low prevalence in 1943.

The information on the occurrence of poliomyelitis in California, Oregon, and Washington suggests that the infection spread northward from southern California where it first appeared in 1943, eventually involving the northern part of the State and finally Oregon and Washington. Examination of the weekly returns of cases reported by certain cities in these three States shows that the disease was first reported in fairly large numbers in Los Angeles in April. The disease made its appearance in San Francisco in May. It began abruptly in Sacramento in June, and finally in Seattle in August. The situation with reference to Texas and the States north of it is not so clear. Cases were reported in comparatively large numbers in several Texas cities in May and June and subsequently in Oklahoma City in July and in Tulsa, Okla., in August. However, in Wichita, Kans., and Kansas City, Mo., the epidemic was already in progress early in July. In these two cities the infection may have spread from foci already established within the

State, namely, the localized areas where epidemics had occurred in 1942, rather than spread from Oklahoma or Texas. In Colorado the disease first appeared in the southern part of the State and later in counties and cities farther north. In the New England area poliomyelitis appeared simultaneously in New Haven and Providence about the middle of July and seems to have spread concentrically to contiguous areas.

One rather unusual feature about the prevalence of poliomyelitis in 1943 was the number of cities in which the disease was epidemic. Records of cases reported for a limited number of cities are available, those having high rates of incidence being shown in table 2. Provisional data indicate that Pueblo, Colo., had the highest morbidity rate per 100,000 population (99.6), and Chicago reported the largest number of cases (1,053). This group of 21 cities, 3 of which were in California and 3 in Texas, reported 22 percent of all the cases reported in the United States in 1943, although having only about 7 percent of the total population. Sacramento and New Haven had case rates appreciably higher than the remainder of the counties in which they are located, and in two others, Salt Lake City and Wichita, the reverse was true. There was no significant difference in rates in the remaining 17 cities as compared with the counties in which they are located. In addition to the 21 cities listed in table 2 there were others in which the evidence indicates high rates of incidence. For instance, Tarrant County, Tex., in which the city of Fort Worth is located, had a rate of 64.1; Multnomah County, Oreg. (Portland), reported 27.1 cases per 100,000; and Alameda (Oakland City), San Diego (San Diego City), and Santa Clara (San Jose City) counties in California reported rates of 32.7, 41.7, and 73.7, respectively. Data for these counties sug-

TABLE 2.—*Poliomyelitis morbidity rates per 100,000 population in certain cities and counties in which cities are located, 1943*

City	Morbidity rate	County	Morbidity rate
Pueblo, Colo	99.6	Pueblo	104.3
Sacramento, Calif	99.0	Sacramento	55.5
New Haven, Conn	62.7	New Haven	47.0
Salt Lake City, Utah	60.6	Salt Lake	86.8
Wichita, Kans	55.6	Sedgwick	116.6
Galveston, Tex	37.7	Galveston	35.7
Dallas, Tex	35.9	Dallas	34.0
Omaha, Nebr	32.6	Douglas	26.8
Chicago, Ill	31.0	Cook	31.3
San Francisco, Calif	23.6	San Francisco	23.6
Los Angeles, Calif	21.6	Los Angeles	28.4
Houston, Tex	20.2	Harris	26.6
Providence, R. I	19.2	Providence	27.4
Seattle, Wash	18.7	King	18.6
Denver, Colo	18.5	Denver	18.5
Shreveport, La	18.4	Caddo	12.0
Bridgeport, Conn	18.3	Fairfield	11.7
Topeka, Kans	17.6	Shawnee	21.9
Kansas City, Mo	16.2	Jackson	18.1
Minneapolis, Minn	14.7	Hennepin	14.4
Fall River, Mass	14.0	Bristol	11.2

gest a high incidence of poliomyelitis in the cities as well as in the counties as a whole.

The fact that many urban areas have had large increases in population in the past few years, might help to explain the relatively large number of cities with high rates of incidence in 1943. Much of this increase presumably has been from rural areas where exposure to the poliomyelitis virus may have been less likely or less frequent.

In the 10-year period from 1933 to 1942 there were 232, or nearly 8 percent of all counties in the United States, which reported no cases. Forty of the 232 counties reported the occurrence of one or more cases in 1943. In only 4 of these can the disease be said to have occurred in sufficient numbers to be called epidemic; one of these, located in Colorado, reported 10 cases (population 6,207). The remaining three, having populations of 4,461, 6,494, and 19,228 were located in Texas. In the order listed they reported 5, 4, and 8 cases. In the case of all 4 counties, they were located in areas where the disease was epidemic as were many of the remaining 36 counties which had not reported any cases during the 10-year period immediately preceding. This might seem to indicate that introduction of clinically recognized cases of poliomyelitis in a community where no cases had been reported for 10 years does not always result in a severe epidemic. However, it is quite probable that the infection was not absent from all of them during the 10-year period but could have existed in an unrecognized form or had occurred in sporadic form and was not reported.

Some of the States in which epidemics of poliomyelitis occurred in 1943 are among those in which outbreaks have occurred fairly frequently in the past two and one-half decades. Morbidity records are not complete for all States continuously since 1915 but a sufficient number exist to indicate that epidemics have occurred more frequently in some States than in others. Even adjoining States have shown wide variations in the number of outbreaks since 1915. The annual morbidity rates from 1915 to 1943, inclusive, for a number of States are shown in figure 2. Selection of States for inclusion in this illustration was made arbitrarily to show differences not only in adjoining States but also in different sections of the country. However, most of the States which have had more than an average number of outbreaks have been included.

Massachusetts, Connecticut, Minnesota, and California have experienced severe epidemics since 1915 more frequently than other States shown in figure 2 and also those not included in this graph, each having 4 outbreaks with rates in excess of 20 per 100,000 population. A rate of 20 or more for a State has indicated either a comparatively high rate of incidence in a limited proportion of the population or a widespread occurrence of the disease in epidemic pro-

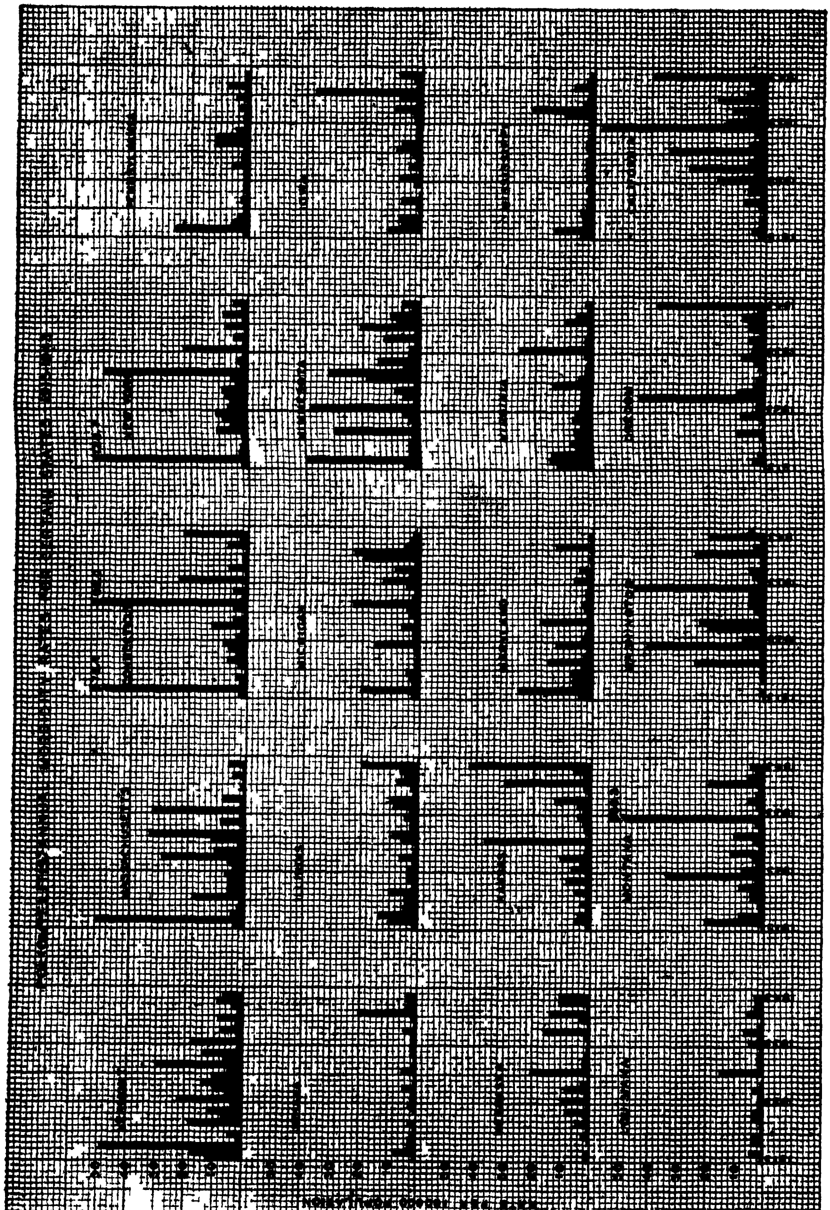


FIGURE 2

portions. Vermont and Montana, as shown in figure 2, have also experienced a more than average number of outbreaks during the same period. It is readily apparent that in many instances adjoining States have shown striking differences in the number of epidemics, such as New York and Pennsylvania, Minnesota and Iowa, Nebraska and Kansas, and Washington or California and Oregon. Differences in frequency and severity of epidemics also are to be found in groups of States. Even though the data are not complete for all States since 1915 it appears that epidemics of poliomyelitis have been less frequent and usually less severe in the East North Central and Southern States than in the New England, Middle Atlantic, West North Central, Mountain, or Pacific groups of States. The rates for the East North Central and Southern States shown in figure 2 are typical for their respective groups.

It does not appear that differences in geography, climate, size of State, or distribution, density, or racial characteristics of the population are factors of importance in accounting for variations in numbers of poliomyelitis outbreaks. Differences in completeness of reporting, differences in proportion of nonparalytic cases of the disease, or both, probably would account for the fact that some States may report higher rates of incidence than others in the same or even in different years but could not account for the wide variations in numbers of outbreaks.

There has been no consistent interval of time between severe outbreaks. The interval may be as short as 2 to 4 years as in California, Washington, Minnesota, and Montana, or in excess of 15 years as in Oregon and New York. Epidemics of moderate severity show equally wide variations. Some States such as Kansas, Nebraska, Louisiana, and California seem to show some indication of increased prevalence of the disease in the past 10 to 15 years (see fig. 2). Too much reliance cannot be placed on this apparent increase since there probably has been more complete reporting of cases or perhaps the inclusion of many nonparalytic cases not previously recorded in recent years. On the other hand there are some States, such as Vermont, New York, Pennsylvania, and Minnesota, where the trend in morbidity rates has apparently been downward. Data for a few large cities indicate similar differences in frequency of outbreaks as noted for States. A period of about three decades does not seem to be sufficiently long to permit any definite conclusions regarding trends in incidence.

INCIDENCE OF HOSPITALIZATION, APRIL 1944

Through the cooperation of the Hospital Service Plan Commission of the American Hospital Association, data on hospital admissions among about 10,000,000 members of Blue Cross Hospital Service Plans are presented monthly. These plans provide prepaid hospital service. The data cover about 60 hospital service plans scattered throughout the country, mostly in large cities.

Item	April 1943	April 1944
1. Number of plans supplying data	65	69
2. Number of persons eligible for hospital care	10,003,704	12,002,748
3. Number of persons admitted for hospital care	85,482	96,306
4. Incidence per 1,000 persons, annual rate, during current month (daily rate×365)	103.9	97.8
5. Incidence per 1,000 persons, annual rate for the 12 months ended April 30	106.7	104.1

DEATHS DURING WEEK ENDED MAY 20, 1944

[From the Weekly Mortality Index, issued by the Bureau of the Census, Department of Commerce]

	Week ended May 20, 1944	Corresponding week, 1943
Data for 92 large cities of the United States:		
Total deaths	8,841	9,119
Average for 3 prior years	8,560	
Total deaths, first 20 weeks of year	195,659	198,620
Deaths under 1 year of age	617	625
Average for 3 prior years	566	
Deaths under 1 year of age, first 20 weeks of year	12,510	13,773
Data from industrial insurance companies:		
Policies in force	66,545,578	65,524,713
Number of death claims	12,919	12,886
Death claims per 1,000 policies in force, annual rate	10.2	10.3
Death claims per 1,000 policies, first 20 weeks of year, annual rate	10.9	10.6

PREVALENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED MAY 27, 1944

Summary

The incidence of meningitis decreased for the country as a whole, and in all of the 9 geographic areas except the New England. A current total of 332 cases was reported, as compared with 385 for the preceding week, 423 for the corresponding week last year, and a 5-year (1939–43) median of 56. Nine States reported 16 or more cases currently. The total number of cases reported for the year to date is 10,609, as compared with 10,253 for the same period last year. For the 12 weeks ended May 27, the cumulative figure is 5,536, and the comparable figure last year was 6,733.

Of a total of 39 cases of poliomyelitis, as compared with 36 last week and 28 for the 5-year median, 9 were reported in Louisiana, 5 in Florida, and 4 each in New York, Texas, and California. The total for the year to date is 501, as compared with 547 for the corresponding period last year and a 5-year median of 481.

A total of 114 cases of typhoid fever was reported, as compared with 115 last week, 68 for the corresponding week last year, and a 5-year median of 120. States reporting the largest numbers are as follows: California 18, Kentucky 11, Pennsylvania 8, Massachusetts and Texas 7 each, and Louisiana 6. The cumulative total to date is 1,605, as compared with 1,236 last year and a 5-year median of 1,702.

For the first time this year the incidence of measles fell below the corresponding weekly 5-year median. Totals of 17,935 cases of measles and 4,365 of scarlet fever were reported, as compared with 5-year medians of 19,116 and 3,218 respectively. Cumulative totals are 521,499 for measles and 128,239 for scarlet fever, as compared with 5-year respective medians of 391,848 and 82,498.

A new low for smallpox has been established. For the first 5 months a total of 244 cases has been reported, as compared with 536 for the same period last year, which was the lowest figure previously recorded.

A total of 8,061 deaths was recorded for the week for 92 large cities of the United States, as compared with 8,224 last week and a 3-year (1941–43) median of 7,653. The total to date is 189,557, as compared with 192,589 for the same period last year.

Telegraphic morbidity reports from State health officers for the week ended May 27, 1944, and comparison with corresponding week of 1943 and 5-year median

In these tables a zero indicates a definite report, while leaders imply that, although none was reported, cases may have occurred.

Division and State	Diphtheria			Influenza			Measles			Meningitis, meningococcus		
	Week ended—		Median 1939–43	Week ended—		Median 1939–43	Week ended—		Median 1939–43	Week ended—		Median 1939–43
	May 27, 1944	May 29, 1943		May 27, 1944	May 29, 1943		May 27, 1944	May 29, 1943		May 27, 1944	May 29, 1943	
NEW ENGLAND												
Maine	0	1	0	0	------	------	[1] 207	81	97	1	3	0
New Hampshire	0	0	0	0	------	------	4	27	28	0	0	0
Vermont	0	0	0	0	------	------	39	224	168	0	0	0
Massachusetts	3	0	2	0	------	------	982	1,715	958	16	13	1
Rhode Island	0	0	0	9	------	------	9	60	133	1	9	0
Connecticut	0	0	0	0	4	2	437	473	400	8	12	3
MIDDLE ATLANTIC												
New York	22	13	19	[2] 1	10	7	614	4,081	2,181	52	92	7
New Jersey	2	3	7	2	10	4	925	2,543	990	18	35	2
Pennsylvania	11	8	9	1	1	------	600	1,658	1,143	20	30	7
EAST NORTH CENTRAL												
Ohio	7	17	11	12	17	9	412	792	309	17	8	1
Indiana	1	7	5	2	11	4	46	162	162	3	1	1
Illinois	13	27	23	9	4	15	419	1,706	287	23	16	0
Michigan [3]	4	4	4	3	2	2	886	4,315	667	35	27	1
Wisconsin	2	0	0	4	37	37	2,122	2,374	1,274	7	1	1
WEST NORTH CENTRAL												
Minnesota	0	3	2	0	------	1	476	647	254	5	4	1
Iowa	1	5	3	0	------	------	226	397	268	7	1	0
Missouri	2	1	5	1	------	1	159	208	189	12	13	0
North Dakota	0	0	0	0	40	2	15	11	18	0	1	0
South Dakota	0	0	1	0	------	------	9	64	53	2	0	0
Nebraska	0	0	1	1	6	1	16	63	63	2	0	0
Kansas	5	4	3	1	1	1	220	377	377	4	0	0
SOUTH ATLANTIC												
Delaware	0	0	0	0	------	------	8	59	20	0	2	0
Maryland [3]	8	6	4	3	5	3	290	221	221	5	14	3
District of Columbia	0	0	0	0	1	------	147	92	92	0	7	0
Virginia	5	2	3	38	81	59	440	186	286	[1] 9	11	2
West Virginia	0	2	3	3	9	9	98	51	32	0	4	1
North Carolina	3	8	6	9	4	3	615	310	557	4	18	1
South Carolina	12	2	3	180	221	221	243	94	94	2	4	1
Georgia	2	7	7	6	8	14	62	294	142	5	1	0
Florida	1	1	1	0	6	6	168	48	152	7	5	0
EAST SOUTH CENTRAL												
Kentucky	2	2	3	25	4	4	74	143	113	3	7	0
Tennessee	3	0	2	8	4	12	44	234	133	3	5	0
Alabama	5	3	3	46	13	21	135	67	149	10	7	2
Mississippi [3]	6	2	2	------	------	------	------	------	0	7	5	1
WEST SOUTH CENTRAL												
Arkansas	3	3	3	10	7	23	45	75	75	1	3	1
Louisiana	0	2	1	2	1	7	34	19	27	4	0	1
Oklahoma	8	1	3	16	10	19	240	35	98	1	0	0
Texas	36	12	16	421	398	182	2,281	293	641	17	10	5
MOUNTAIN												
Montana	0	0	1	0	------	4	74	258	145	0	1	0
Idaho	0	0	0	0	------	------	19	50	50	0	10	0
Wyoming	0	0	0	0	18	3	82	110	71	0	0	0
Colorado	5	7	8	9	58	20	114	430	231	1	2	1
New Mexico	7	0	1	4	1	1	106	22	23	0	0	0
Arizona	4	2	2	40	33	55	80	67	67	1	2	0
Utah	0	0	0	4	7	5	52	134	134	0	2	0
Nevada	1	0	0	0	------	------	9	0	0	0	0	0
PACIFIC												
Washington	8	4	2	0	3	1	274	532	532	1	11	1
Oregon	1	3	2	3	14	10	0	137	137	2	4	0
California	18	15	11	11	33	55	3,378	679	734	16	23	1
Total	211	177	199	884	1,082	914	[1] 17,935	26,618	19,116	332	423	56
21 weeks	4,763	5,297	5,649	332,541	73,723	146,309	521,499	422,963	391,848	10,609	10,276	1,029

See footnotes at end of table.

Telegraphic morbidity reports from State health officers for the week ended May 27, 1944, and comparison with corresponding week of 1943 and 5-year median—Con.

Division and State	Poliomyelitis			Scarlet fever			Smallpox			[4] Typhoid and paratyphoid fever		
	Week ended—		Median 1939–43	Week ended—		Median 1939–43	Week ended—		Median 1939–43	Week ended—		Median 1939–43
	May 27, 1944	May 29, 1943		May 27, 1944	May 29, 1943		May 27, 1944	May 29, 1943		May 27, 1944	May 29, 1943	
NEW ENGLAND												
Maine	0	0	0	34	17	13	0	0	0	0	0	0
New Hampshire	0	0	0	0	11	4	0	0	0	0	0	0
Vermont	0	0	0	6	14	5	0	0	0	0	0	0
Massachusetts	0	0	0	286	465	181	0	0	0	7	3	2
Rhode Island	0	0	0	7	23	6	0	0	0	1	0	0
Connecticut	0	0	0	58	107	58	0	0	0	1	1	1
MIDDLE ATLANTIC												
New York	4	0	1	448	429	486	0	0	0	4	1	5
New Jersey	0	0	0	237	101	221	0	0	0	3	1	1
Pennsylvania	1	1	0	464	239	307	0	0	0	8	5	8
EAST NORTH CENTRAL												
Ohio	1	0	0	371	201	213	0	2	1	0	8	7
Indiana	0	0	0	38	19	87	2	2	1	2	1	2
Illinois	0	0	1	275	160	269	0	0	3	3	2	4
Michigan [3]	0	0	0	327	130	267	0	0	0	1	0	3
Wisconsin	0	1	0	292	317	149	1	0	2	0	1	0
WEST NORTH CENTRAL												
Minnesota	1	0	0	125	45	52	0	0	0	0	0	0
Iowa	0	0	0	156	42	42	0	1	4	0	3	1
Missouri	0	0	0	61	58	55	0	0	2	5	0	1
North Dakota	0	0	0	32	5	5	0	1	1	0	0	0
South Dakota	0	0	0	11	3	6	0	0	4	0	0	0
Nebraska	0	0	0	11	8	9	0	0	0	0	0	0
Kansas	1	1	0	51	28	53	0	0	0	1	0	0
SOUTH ATLANTIC												
Delaware	0	0	0	8	4	4	0	0	0	0	0	0
Maryland [3]	0	0	0	122	49	39	0	0	0	2	3	3
District of Columbia	0	0	0	82	12	13	0	0	0	0	3	0
Virginia	1	1	0	55	25	15	0	0	0	0	1	4
West Virginia	0	0	0	67	13	24	0	0	0	3	1	1
North Carolina	1	0	0	20	15	14	0	1	0	5	1	2
South Carolina	0	0	1	5	5	5	0	0	0	4	0	1
Georgia	0	1	0	16	7	8	0	0	0	5	6	9
Florida	5	0	1	3	5	3	0	1	0	3	3	3
EAST SOUTH CENTRAL												
Kentucky	1	0	0	49	25	30	0	2	0	11	0	3
Tennessee	0	0	0	26	20	25	0	0	3	4	0	1
Alabama	2	0	1	8	9	6	0	0	0	3	1	1
Mississippi [3]	2	0	0	4	1	1	1	1	1	2	4	2
WEST SOUTH CENTRAL												
Arkansas	0	1	0	4	1	4	0	1	1	1	1	3
Louisiana	9	1	1	1	0	4	3	0	0	6	3	7
Oklahoma	0	0	0	[1] 14	4	12	0	0	1	3	1	4
Texas	4	6	0	57	43	24	0	6	4	7	6	8
MOUNTAIN												
Montana	0	0	0	25	14	14	0	0	0	0	0	0
Idaho	0	0	0	21	92	4	0	0	0	0	1	0
Wyoming	0	0	0	6	24	4	0	0	0	0	0	0
Colorado	1	0	0	29	56	20	0	0	2	0	1	1
New Mexico	0	1	0	11	7	7	0	0	0	0	0	0
Arizona	1	3	0	24	• 15	10	0	0	1	0	0	0
Utah	0	0	0	43	32	15	0	0	0	0	1	0
Nevada	0	0	0	1	------	0	0	1	0	0	0	0
PACIFIC												
Washington	0	1	0	124	43	36	0	0	0	0	0	0
Oregon	0	1	1	90	16	9	0	0	1	1	1	2
California	4	9	5	160	129	117	0	0	0	18	4	6
Total	39	28	28	4,365	3,088	3,218	7	19	34	114	68	120
21 weeks	501	547	481	128,239	82,496	82,498	244	536	953	1,605	1,296	1,702

See footnotes at end of table.

Telegraphic morbidity reports from State health officers for the week ended May 27, 1944, and comparison with corresponding week of 1943 and a 5-year median—Con.

Division and State	Whooping cough: Week ended— May 27, 1944	Whooping cough: Week ended— May 29, 1943	Whooping cough: Median 1939-43	Week ended May 27, 1944: Anthrax	Dysentery: Amebic	Dysentery: Bacillary	Dysentery: Unspecified	Encephalitis, infectious	Leprosy	Rocky Mt. spotted fever	Tularemia	Typhus fever
NEW ENGLAND												
Maine	2	80	34	0	0	0	0	0	0	0	0	0
New Hampshire	0	5	4	0	0	0	0	0	0	0	0	0
Vermont	5	12	30	0	0	0	0	0	0	0	0	0
Massachusetts	57	118	161	0	0	0	0	0	0	0	0	0
Rhode Island	5	18	23	0	0	0	0	0	0	0	0	0
Connecticut	39	39	66	0	0	1	0	0	0	0	0	0
MIDDLE ATLANTIC												
New York	102	254	313	0	3	13	0	2	0	1	0	0
New Jersey	57	172	194	0	0	0	0	2	0	0	0	0
Pennsylvania	70	184	238	0	1	0	0	0	0	0	0	0
EAST NORTH CENTRAL												
Ohio	64	94	181	0	0	0	0	1	0	0	0	0
Indiana	4	44	44	0	0	0	0	0	0	0	0	0
Illinois	33	119	119	0	0	0	0	0	0	0	0	0
Michigan [3]	51	304	279	0	0	0	0	1	0	0	0	0
Wisconsin	60	212	125	0	0	0	0	0	0	0	0	0
WEST NORTH CENTRAL												
Minnesota	20	86	44	0	0	0	0	0	0	0	0	0
Iowa	11	65	28	0	0	0	0	0	0	0	0	0
Missouri	21	4	21	0	0	0	0	0	0	0	0	0
North Dakota	0	1	3	0	0	0	0	1	0	0	0	0
South Dakota	5	6	4	0	0	0	0	0	0	0	0	0
Nebraska	0	20	7	0	0	0	0	0	0	0	0	0
Kansas	43	101	63	0	0	0	0	0	0	0	0	0
SOUTH ATLANTIC												
Delaware	0	2	2	0	0	0	0	0	0	0	0	0
Maryland [3]	54	129	106	0	0	0	4	0	0	4	1	0
District of Columbia	4	39	17	0	0	0	0	0	0	1	0	0
Virginia	104	116	83	0	0	0	79	0	0	3	0	0
West Virginia	21	26	26	0	0	0	0	0	0	0	0	0
North Carolina	147	238	238	0	0	0	0	0	0	2	0	1
South Carolina	91	97	74	0	0	0	0	0	0	1	0	2
Georgia	13	63	35	0	1	3	0	0	0	0	1	12
Florida	22	34	24	0	3	61	0	0	0	0	1	9
EAST SOUTH CENTRAL												
Kentucky	80	41	41	0	0	0	0	0	0	0	0	0
Tennessee	16	67	65	0	0	0	0	0	0	0	0	1
Alabama	26	51	51	0	2	0	0	1	0	0	0	9
Mississippi [3]	0	------	0	0	0	0	0	0	0	0	1	1
WEST SOUTH CENTRAL												
Arkansas	5	51	33	0	0	12	0	0	0	0	2	0
Louisiana	2	14	14	0	1	0	0	0	0	0	0	0
Oklahoma	7	22	23	0	0	0	0	0	0	0	0	0
Texas	263	548	374	0	13	476	0	1	0	0	2	29
MOUNTAIN												
Montana	1	22	22	0	0	0	0	0	0	1	1	0
Idaho	0	3	3	0	0	0	0	1	0	0	1	0
Wyoming	1	1	3	0	0	0	0	0	0	1	0	0
Colorado	21	17	19	0	0	0	0	0	0	2	0	0
New Mexico	4	10	40	0	1	2	0	0	0	0	0	0
Arizona	16	23	23	0	0	0	34	0	0	0	0	0
Utah	72	66	52	0	0	0	0	0	0	0	0	0
Nevada	0	0	0	0	0	0	0	0	0	0	0	0
PACIFIC												
Washington	8	57	57	0	0	0	0	0	0	0	0	0
Oregon	5	28	20	0	0	0	0	0	0	0	0	0
California	90	378	378	0	0	3	0	0	0	0	0	0
Total	1,722	4,081	3,806	0	25	571	117	10	0	16	10	64
21 weeks	37,697	85,198	88,808	17	534	5,446	1,549	226	13	47	221	941
21 weeks, 1943	------	------	------	28	626	4,342	1,042	230	10	70	364	967

[1] Exclusive of delayed reports (included in cumulative totals only) as follows: *Measles*—Maine, week ended Apr. 22, 236 cases; *meningococcus meningitis*—Virginia, 7 cases; *scarlet fever*—Oklahoma, week ended Apr. 22, 19 cases.

[2] New York City only.

[3] Period ended earlier than Saturday.

[4] Including paratyphoid fever reported separately as follows: Massachusetts 7, Illinois 1, Michigan 1 Maryland 1, Florida 1.

WEEKLY REPORTS FROM CITIES

City reports for week ended May 13, 1944

This table lists the reports from 83 cities of more than 10,000 population distributed throughout the United States, and represents a cross section of the current urban incidence of the diseases included in the table

	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
NEW ENGLAND												
Maine:												
Portland	0	0	0	0	48	0	2	0	15	0	1	1
New Hampshire:												
Concord	0	0	------	0	0	0	0	0	0	0	0	0
Massachusetts:												
Boston	1	0	------	0	198	7	13	0	82	0	0	17
Fall River	0	0	------	0	36	0	1	0	0	0	0	1
Springfield	0	0	------	0	54	1	0	0	25	0	1	11
Worcester	0	0	------	0	3	0	10	0	45	0	0	7
Rhode Island:												
Providence	0	0	1	0	47	0	3	0	4	0	0	6
Connecticut:												
Bridgeport	0	0	------	0	2	0	0	0	2	0	0	1
Hartford	0	0	------	0	13	0	3	0	26	0	0	0
New Haven	0	0	1	0	62	0	1	0	4	0	0	3
MIDDLE ATLANTIC												
New York:												
Buffalo	0	0	------	0	13	1	9	0	9	0	0	0
New York	8	0	5	2	691	24	67	0	289	0	1	29
Syracuse	0	0	------	0	7	0	2	0	1	0	0	5
New Jersey:												
Camden	0	0	1	1	4	0	1	0	29	0	0	0
Newark	0	0	1	0	236	4	10	0	37	0	0	5
Trenton	0	0	1	0	4	1	4	0	8	0	0	0
Pennsylvania:												
Philadelphia	2	0	1	0	57	7	20	0	123	0	1	7
Pittsburgh	0	1	2	2	15	10	10	0	28	0	0	8
Reading	0	0	------	0	1	1	2	0	1	0	0	0
EAST NORTH CENTRAL												
Ohio:												
Cincinnati	3	0	1	0	42	0	2	0	72	0	0	2
Cleveland	0	0	4	0	45	7	9	0	137	0	1	9
Columbus	0	0	------	0	24	0	2	0	5	0	0	5
Indiana:												
Fort Wayne	0	0	------	0	0	0	3	0	4	0	0	0
Indianapolis	4	0	------	0	80	0	4	0	52	0	1	6
South Bend	0	0	------	0	1	1	0	0	1	0	0	0
Terre Haute	0	0	------	0	1	0	4	0	0	0	1	0
Illinois:												
Chicago	2	0	2	1	145	15	26	0	175	0	1	7
Springfield	0	0	------	0	36	0	3	0	3	0	0	0
Michigan:												
Detroit	3	0	------	1	89	14	14	0	135	0	1	28
Flint	0	0	------	0	6	0	2	0	3	0	0	6
Grand Rapids	0	0	------	1	13	2	0	0	10	0	0	0
Wisconsin:												
Kenosha	0	0	------	0	260	0	0	0	1	0	0	6
Milwaukee	0	0	------	0	202	3	0	0	62	0	0	14
Racine	0	0	------	0	72	0	1	0	1	0	0	8
Superior	0	0	------	0	6	0	1	0	9	0	0	0
WEST NORTH CENTRAL												
Minnesota:												
Minneapolis	0	0	------	0	248	1	3	0	36	0	0	5
St. Paul	0	0	------	0	108	1	4	0	19	0	0	3
Missouri:												
Kansas City	1	0	------	0	66	3	9	0	37	0	0	1
St. Joseph	0	0	------	0	2	0	0	0	8	0	0	0
St. Louis	1	0	2	1	56	11	10	0	32	0	1	10

City reports for week ended May 13, 1944—Continued

	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
WEST NORTH CENTRAL—continued												
North Dakota:												
Fargo	0	0		0	0	0	1	0	8	0	0	0
Nebraska:												
Omaha	2	0		0	111	0	8	0	23	0	0	0
Kansas:												
Wichita	0	0		0	53	0	2	0	7	0	0	0
SOUTH ATLANTIC												
Delaware:												
Wilmington	0	0		0	0	0	1	0	0	0	0	0
Maryland:												
Baltimore	5	0		0	285	6	8	0	89	0	0	42
Cumberland	0	0		0	0	0	0	0	0	0	0	0
Frederick	0	0		0	0	0	0	0	3	0	0	0
District of Columbia:												
Washington	0	0	2	2	194	3	6	0	119	0	0	3
Virginia:												
Lynchburg	0	0	1	0	6	0	0	0	1	0	0	1
Roanoke	1	0		0	6	0	0	0	1	0	0	4
West Virginia:												
Charleston	0	0		0	0	0	0	0	8	0	0	0
Wheeling	0	0		0	48	0	0	0	11	0	0	2
North Carolina:												
Raleigh	0	0		0	129	0	1	0	0	0	0	0
Wilmington	0	0		0	16	0	1	0	0	0	0	4
Winston-Salem	1	0		0	28	0	1	0	0	0	0	0
South Carolina:												
Charleston	0	0		0	0	0	2	0	1	0	0	0
Georgia:												
Atlanta	2	0	6	0	4	0	2	0	12	0	0	0
Brunswick	0	0		0	2	0	1	0	0	0	0	0
Savannah	0	0		0	3	2	3	0	1	0	0	0
Florida:												
Tampa	1	0	3	0	19	0	2	0	1	0	0	1
EAST SOUTH CENTRAL												
Tennessee:												
Memphis	0	0	2	1	17	4	2	0	28	0	0	3
Alabama:												
Birmingham	0	0	6	0	8	1	3	0	1	0	0	1
Mobile	0	0		0	1	0	1	0	0	0	0	1
WEST SOUTH CENTRAL												
Arkansas:												
Little Rock	0	0		0	3	1	5	0	1	0	0	0
Louisiana:												
New Orleans	0	0	1	0	21	2	2	4	6	0	1	1
Texas:												
Dallas	0	0		0	132	0	2	0	1	0	2	3
Galveston	1	0		0	3	0	0	0	0	0	0	0
Houston	0	0		0	5	1	9	0	4	0	1	0
San Antonio	1	0	1	0	1	0	5	0	0	0	0	0
MOUNTAIN												
Montana:												
Billings	0	0		0	29	0	1	0	0	1	0	0
Great Falls	0	0		0	4	0	0	0	4	0	0	1
Helena	0	0		0	4	0	0	0	0	0	0	0
Missoula	0	0		0	23	0	0	0	2	0	0	0
Idaho:												
Boise	0	0		0	6	0	0	0	5	0	0	0
Colorado:												
Denver	1	0	1	0	92	3	6	0	20	0	0	13
Pueblo	0	0		0	2	0	3	0	7	0	0	1
Utah:												
Salt Lake City	0	0		0	23	0	3	0	30	0	0	8

City reports for week ended May 13, 1944—Continued

	Diphtheria cases	Encephalitis, infectious, cases	Influenza Cases	Influenza Deaths	Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
PACIFIC												
Washington:												
Seattle	0	0		0	53	0	11	0	29	0	1	0
Spokane	0	0		0	46	1	2	0	4	0	0	2
Tacoma	0	0		0	12	1	0	0	34	0	0	0
California:												
Los Angeles	6	0	7	0	546	7	8	1	24	0	0	6
Sacramento	0	0		0	75	0	2	0	13	0	0	2
San Francisco	0	0	2	0	380	6	7	0	86	0	0	11
Total	46	1	54	12	5,383	152	361	6	2,064	1	15	320
Corresponding week, 1943	55		81	27	8,142		424		1,670	1	11	1,174
Average, 1939–43	69		90	[1] 21	[2] 6,969		[1] 340		1,465	5	18	1,196

[1] 3-year average, 1941–43.
[2] 5-year median.

Dysentery, amebic.—Cases: Columbus, 1; Detroit, 1; St. Louis, 1; Baltimore, 1.
Dysentery, bacillary.—Cases: Worcester, 32; Providence, 3; New York, 4; Philadelphia, 1; Detroit, 1; Wheeling, 2; Charleston, S. C., 8.
Dysentery, unspecified.—Cases: San Antonio, 21.
Leprosy.—Cases: Newark, 1; Baltimore, 1.
Typhus fever, endemic.—Cases: Atlanta, 1; Tampa, 5; Birmingham, 1; Houston, 2; San Antonio, 1.

Rates (annual basis) per 100,000 population, by geographic groups, for the 83 cities in the preceding table (estimated population, 1943, 33,580,400)

	Diphtheria case rates	Encephalitis, infectious, case rates	Influenza Case rates	Influenza Death rates	Measles case rates	Meningitis, meningococcus, case rates	Pneumonia death rates	Poliomyelitis case rates	Scarlet fever case rates	Smallpox case rates	Typhoid and paratyphoid fever case rates	Whooping cough case rates
New England	2.5	0.0	5.0	0.0	1,163	20.1	82.9	2.5	510	0.0	5.0	118
Middle Atlantic	4.7	0.5	5.1	2.3	480	22.4	58.3	0.0	245	0.0	0.9	25
East North Central	7.3	0.0	4.3	1.8	623	25.6	43.3	0.0	409	0.0	3.1	56
West North Central	8.4	0.0	4.2	2.1	1,349	33.5	67.0	0.0	356	0.0	2.1	40
South Atlantic	17.4	0.0	20.9	3.5	1,290	19.2	48.8	0.0	431	0.0	0.0	99
East South Central	0.0	0.0	57.8	7.2	188	36.1	43.3	0.0	210	0.0	0.0	29
West South Central	6.0	0.0	6.0	0.0	492	11.9	68.5	11.9	36	0.0	11.9	12
Mountain	7.9	0.0	7.9	0.0	1,450	23.8	103.0	0.0	539	7.9	0.0	182
Pacific	9.9	0.0	14.8	0.0	1,834	24.7	49.5	1.6	231	0.0	1.6	35
Total	7.2	0.2	8.4	1.9	838	23.7	56.2	0.9	321	0.2	2.3	50

TERRITORIES AND POSSESSIONS

Hawaii Territory

Honolulu—Dengue fever.—For the period April 16–30, 1944, 5 cases of dengue fever were reported in Honolulu, T. H., bringing the total number of cases reported since the beginning of the outbreak to 1,478. These 5 cases represent a decrease of 12 cases from the

preceding semimonthly period and is the lowest semimonthly incidence of the disease since the inauguration of the dengue mosquito control program.

Puerto Rico

Communicable diseases—Year 1943.—During the year 1943 cases of certain communicable diseases were reported in Puerto Rico as follows:

Disease	Cases	Disease	Cases
Chickenpox	566	Ophthalmia neonatorum	17
Diphtheria	814	Poliomyelitis	31
Dysentery	136	Puerperal fever	19
Erysipelas	26	Syphilis	12,102
Filariasis	36	Tetanus	90
Gonorrhea	3,607	Tetanus, infantile	8
Influenza	13,041	Tuberculosis (all forms)	7,158
Leprosy	6	Typhoid fever	270
Malaria	16,082	Typhus fever (endemic)	102
Measles	37	Whooping cough	916
Mumps	66	Other diseases	18

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—Week ended April 29, 1944.—During the week ended April 29, 1944, cases of certain communicable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox		10		159	348	46	44	59	194	860
Diphtheria	2	10	6	33		2	3	2		58
Dysentery (bacillary)				2						2
Encephalitis, infectious							1			1
German measles		1		153	201	7	30	9	74	475
Influenza			1		47		193		4	245
Measles	1	25	11	1,012	552	335	98	135	40	2,209
Meningitis, meningococcus			1	1	4		1			7
Mumps	1	11	1	287	309	51	17	24	66	767
Poliomyelitis			1							1
Scarlet fever		27	10	76	280	51	32	72	88	636
Tuberculosis (all forms)			1	138	46	15	16		20	236
Typhoid and paratyphoid fever				17	3			6	2	28
Undulant fever				1	2					3
Whooping cough		26		63	52	10	43	8	35	237

GREAT BRITAIN

England and Wales—Infectious diseases—4 weeks ended February 26, 1944.—During the 4 weeks ended February 26, 1944, cases of certain infectious diseases were reported in England and Wales as follows:

Disease	Cases	Disease	Cases
Cerebrospinal fever	275	Pneumonia	3,856
Diphtheria	2,799	Puerperal pyrexia and puerperal sepsis	666
Dysentery	892	Scarlet fever	7,913
Measles, excluding German measles	5,823	Typhoid fever	34
Ophthalmia neonatorum	302	Whooping cough	7,760
Paratyphoid fever	23		

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

NOTE.—Except in cases of unusual incidence, only those places are included which had not previously reported any of the above-mentioned diseases, except yellow fever, during the current year. All reports of yellow fever are published currently.

A table showing the accumulated figures for these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.

(Few reports are available from the invaded countries of Europe and other nations in war zones.)

Plague

Egypt—Ismailiya.—Plague has been reported in Ismailiya, Egypt, as follows: Week ended May 13, 1944, 39 cases with 21 deaths, including 12 cases with 4 deaths in the southern areas; week ended May 20, 1944, 49 cases with 28 deaths, including 9 cases in the southern areas.

French West Africa—Dakar.—During the week ended May 20, 1944, 1 case of plague was reported in Dakar, French West Africa.

India—Calcutta.—For the week ended April 22, 1944, 2 deaths from plague were reported in Calcutta, India.

Peru.—Plague has been reported in Peru by Departments, as follows: January—Libertad, 2 cases, 1 death, Lima, 5 cases, 3 deaths; February—Libertad, 2 cases, 2 deaths, Lima, 5 cases; March—Libertad, 1 case, Lima, 6 cases, 1 death.

Smallpox

British East Africa—Uganda.—Smallpox has been reported in Uganda, British East Africa, as follows: Week ended April 15, 1944, 92 cases; week ended April 22, 1944, 171 cases.

French Equatorial Africa.—Smallpox has been reported in French Equatorial Africa as follows: February 1944, 137 cases; March 1944, 221 cases, 36 deaths.

India—Bombay.—For the week ended April 22, 1944, 99 cases of smallpox with 42 deaths were reported in Bombay, India.

Nigeria.—Smallpox has been reported in Nigeria as follows: Week ended April 15, 1944, 55 cases, 20 deaths; week ended April 22, 1944, 140 cases, 21 deaths.

Typhus Fever

Bulgaria.—For the period March 2–9, 1944, 89 cases of typhus fever were reported in Bulgaria.

Hungary.—For the week ended April 29, 1944, 250 cases of typhus fever (including 179 cases in Subcarpathia) were reported in Hungary.

Slovakia.—For the 3 weeks ended April 15, 1944, 34 cases of typhus fever were reported in Slovakia.

Turkey.—For the month of March 1944, 561 cases of typhus fever were reported in Turkey.

Union of South Africa—Cape Province.—Typhus fever has been reported in Cape Province, Union of South Africa, as follows: Weeks ended—April 1, 1944, 65 cases; April 8, 1944, 43 cases; April 15, 1944, 95 cases.

* * *

COURT DECISION ON PUBLIC HEALTH

Convictions under Federal filled milk act upheld.—(United States Circuit Court of Appeals, 4th Circuit; *Carolene Products Co. et al.* v. *United States*, 140 F. 2d 61; decided January 10, 1944.) The Federal filled milk act declared that filled milk, as defined in the act, was an adulterated article of food, injurious to the public health, and that its sale constituted a fraud upon the public. Among other things, the act made unlawful the shipment or delivery for shipment, in interstate commerce, of any filled milk, which term was defined as meaning "any milk, cream, or skimmed milk, whether or not condensed, evaporated, concentrated, powdered, dried, or desiccated, to which has been added, or which has been blended or compounded with, any fat or oil other than milk fat, so that the resulting product is in imitation or semblance of milk, cream, or skimmed milk, whether or not condensed, evaporated, concentrated, powdered, dried, or desiccated." Distinctive proprietary food compounds meeting certain requirements were excluded from the definition. The appellant company and two of its officials were convicted of violating the said statute. Two products were involved—one resulting from the mixture of skimmed milk, coconut oil, and fish oil, and the other the same except that cottonseed oil was substituted for coconut oil. Both of these products were sold under the name of "Carolene." In its statement of the facts the trial court said: "'Carolene' looked, tasted, and smelled like condensed whole milk and was of practically the same texture and consistency. It was packed in cans of the same size and shape customarily employed by packers of condensed, whole milk."

The defendants appealed to the circuit court of appeals, contending that the filled milk act did not apply to Carolene because that product (1) was a wholesome and nutritive food, (2) was not "in imitation or semblance of milk, cream, or skimmed milk, whether or not condensed," etc., and (3) was properly branded, so that no fraud was perpetrated on the public in its sale. The defendants further contended that the act, if held to prohibit Carolene, was unconstitutional when so applied. The argument was that when Congress passed the law in 1923 medical science knew very little about vitamins and that the Congressional intent, therefore, in enacting the statute was to protect the public

against milk products from which the essential vitamins had been removed. Since the addition of fish oil to Carolene replaced the lost vitamins, the defendants urged, there was no justification in fact or in law for their conviction under the statute as written and enacted. The lower court had rejected these contentions and the appellate court agreed with the conclusions. "The fact," said the latter court, "that the inclusion of Carolene within the ambit of the statute leads to a seemingly harsh and inequitable result does not justify our giving to the statute the restrictive construction for which the defendants contend." According to the court the matter was one for the consideration of the legislature and not the courts, and the court's notion of expediency and propriety could not be substituted for the considered will of Congress expressed in the clear and unambiguous terms of the act. The power of the legislature could not be denied merely because an innocent article might conceivably fall within the class prohibited by the statute and Congress may with constitutional impunity bar from interstate commerce goods which may be the subject of a fraudulent sale, although the goods themselves may not be injurious.

The judgment of the district court was affirmed.

×

FEDERAL SECURITY AGENCY

UNITED STATES PUBLIC HEALTH SERVICE

THOMAS PARRAN, *Surgeon General*

DIVISION OF PUBLIC HEALTH METHODS

G. ST. J. PERROTT, *Chief of Division*

THE PUBLIC HEALTH REPORTS, first published in 1878 under authority of an act of Congress of April 29 of that year, is issued weekly by the United States Public Health Service through the Division of Public Health Methods, pursuant to the following authority of law: United States Code, title 42, sections 7, 30, 93; title 44, section 220.

It contains (1) current information regarding the prevalence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

The PUBLIC HEALTH REPORTS is published primarily for distribution, in accordance with the law, to health officers, members of boards or departments of health, and other persons directly or indirectly engaged in public health work. Articles of special interest are issued as reprints or as supplements, in which forms they are made available for more economical and general distribution.

Requests for and communications regarding the PUBLIC HEALTH REPORTS, reprints, or supplements should be addressed to the Surgeon General, United States Public Health Service, Washington 14, D. C. Subscribers should remit direct to the Superintendent of Documents, Washington 25, D. C.

Librarians and others should preserve their copies for binding, as the Public Health Service is unable to supply the general demand for bound copies. Indexes will be supplied upon request.

UNITED STATES GOVERNMENT PRINTING OFFICE, WASHINGTON : 1944

For sale by the Superintendent of Documents, Washington 25, D. C.

Price 5 cents. Subscription price $2.50 a year

Public Health Reports

VOLUME 59 JUNE 9, 1944 NUMBER 23

IN THIS ISSUE

Toxicity of Neoarsphenamine and Sulfarsphenamine

CONTENTS

Public Health Reports

Vol. 59 • JUNE 9, 1944 • *No. 23*

SULFARSPHENAMINE IN THE THERAPY OF SYPHILIS. A COMPARATIVE STUDY OF THE TOXIC MANIFESTATIONS OF NEOARSPHENAMINE AND SULFARSPHENAMINE *

By THOMAS F. PROBEY,[1] *Pharmacologist*, EDGAR W. NORRIS,[2] *Medical Director*, AUSTIN V. DEIBERT,[2] *Senior Surgeon*, and ELEANOR V. PRICE,[3] *Assistant Statistician, United States Public Health Service*

The 1936 Conference on Venereal Disease Control Work (*1*) recommended that the ideal antisyphilitic drug for distribution by health departments to clinics and practitioners should be effective, easily administered, free from reactions, and low in price.

In several respects sulfarsphenamine would qualify as such a drug, especially for its ease and flexibility of administration. It has, however, the reputation of being a dangerous drug when given to adults, which would exclude it from consideration. There is equally good evidence that sulfarsphenamine is a safe and reliable drug to use in the treatment of syphilis and is the drug of choice especially for the general practitioner. Because of this difference of opinion concerning the toxicity of sulfarsphenamine, the clinical and laboratory evidence is reviewed to determine the usability of this drug in the treatment of syphilis.

Although sulfarsphenamine had been manufactured and used extensively for several years in France under the trade name of Sulfarsenol, and the Laboratorie de Biochemie held United States license and exported some material to America, it was not until Voegtlin and Johnson (*2*) developed the process of manufacture that it was given extensive clinical trial in this country.

Laboratory investigations (*3*, *4*, *5*, *6*) indicated that sulfarsphenamine would be the equal of, if not superior to, other members of the

*This study was instituted at the suggestion of W. T. Harrison, Medical Director, and approved by the Cooperative Clinical Group of the Public Health Service. Medical Director R. A. Vonderlehr effected the arrangements for the clinical facilities at Hot Springs to conduct the clinical investigation. The active interest and cooperation of Doctors Vonderlehr and Harrison was of material assistance in organizing and conducting the study.

[1] Biologics Control Laboratory, National Institute of Health.

[2] Venereal Disease Medical Center, Hot Springs, Ark.

[3] Venereal Disease Division.

arsphenamine group. The product was more stable both in the ampule and in solution; it was less toxic in laboratory animals, slightly less effective trypanocidally than neoarsphenamine (*3*), but as a spirocheticidal agent equally effective as arsphenamine and neoarsphenamine (*5*, *6*); it was the most effective arsphenamine derivative and compared favorably with the highly effective pentavalent arsenicals in penetrating into the cerebrospinal fluid (*4*). In addition to these advantages, laboratory investigations also indicated that sulfarsphenamine injected intramuscularly was equally as effective as arsphenamine or neoarsphenamine injected intravenously (*6*). In this respect sulfarsphenamine indicated a definite advance in the therapy of syphilis as arsphenamine and neoarsphenamine had both proved to be definitely unsatisfactory when injected intramuscularly.

When first placed on the market, sulfarsphenamine was used extensively but owing to reactions it has been discarded to a great extent in general therapy of syphilis. Clinical experience indicated that the reaction incidence was high, the reactions being severe and showing a tendency to blood dyscrasias (*7*). The drug was introduced for the general therapy of syphilis on the basis of early laboratory investigations before the necessary clinical work had been done to determine dosage, treatment schedules, etc.

Salvarsan, neosalvarsan, and the other derivatives of salvarsan were similarly unsatisfactory when first introduced. The report of the Salvarsan Committee of Great Britain on the toxic effects following the employment of arsenobenzol preparations (*8*) reviewed the history of the German investigations of 1914 and 1917 relating to the salvarsan treatment of syphilis and the ill effects observed after its use. These investigations were instituted because of severe criticism which finally resulted in a petition being presented to the Chamber of Deputies demanding prohibition of the use of salvarsan. Because of the high fatality rate after neosalvarsan therapy, the Salvarsan Committee of the Allgemeiner Aerztlicher Verein of Munich in 1920 recommended restriction in the size of the dose to the maximum of 0.6 gm.

REACTIONS IN THE ARSPHENAMINE THERAPY OF SYPHILIS

Reactions following the administration of arsphenamines are due primarily to the arsenic content of the preparation and secondarily to the phenol or aminophenol radical. Possibly the combination plays a greater role as an etiologic agent than either one individually. Inorganic arsenical compounds (*9*) systemically relax the capillaries and increase their permeability, thus simulating inflammation. This change is most conspicuous in the splanchnic area. Acute arsenic poisoning results in extreme gastro-enteritis. The dilatation of capillaries—capillary paralysis—introduces changes in the circulation which cause secondary disturbances in the functioning of more remote

organs, particularly the nervous system. Fatty degeneration of the cells is evident, especially in glands and muscles, with other disturbances of nutrition and metabolism. This is true in chronic poisoning. There are also characteristic effects on the bones and bone marrow.

Kolmer (*10*) in his discussion of the clinical significance of the changes produced by arsphenamine and its derivatives—the toxic reactions due to arsenic—concludes that most of the tissue changes are due to some form of arsenic, and the outstanding changes are, first, an effect upon the capillaries characterized by relaxation and congestion with serous exudate and minute hemorrhages which are characteristic tissue changes consequent upon arsenic poisoning, and, second, parenchymatous degeneration and necrosis.

Post-mortem findings in fatal cases following arsphenamine therapy definitely indicate that arsenic is the agent causing death.

Cook (*11*), reviewing the autopsies of 44 cases of the 63 deaths reported during the 17-year period 1919–35, recorded that "the striking features are the frequency of edema, congestion, and hemorrhages in the different organs. This is not surprising when one recalls that one of the effects of arsenic is to cause dilation of the capillaries with increased permeability. An additional effect is attributed to the drug by many authorities, namely, damage to the endothelial lining of the capillaries. If this action extends to the reticulo-endothelial systems, one has a basis for nearly all the manifestations of arsenic poisoning. It is obvious that these factors will produce marked variations in symptomatology and pathology, depending on the location and amount of edema and hemorrhage." The pathologic findings presented, according to Cook, are suggestive of a common basis for the diverse clinical signs of arsphenamine poisoning.

Hahn (*12*) presents autopsy data on 35 of 47 deaths resulting from antisyphilitic treatment reported at the Johns Hopkins Hospital during the period from 1913 to 1940. It is his opinion that hemorrhage is not primarily a manifestation of arsenical toxicity but is a secondary complication. Hepatic necrosis, dermatitis, and hypoplasia of the bone marrow were the most frequent pathologic diagnoses. Multiple hemorrhages in the viscera, skin, and mucous and serous membranes were reported in 16 of the 35 autopsies.

The British Salvarsan Committee (*8*) concluded, from evidence presented for its study, that many of the ill effects of salvarsan could be attributed directly to its arsenical content, and that other complications such as liver and bone marrow damage probably were due to the whole chemical composition of the compound and not solely to arsenic.

Reactions following arsphenamine therapy are primarily quantitative, and to some extent qualitative. The quantitative aspect of arsphenamine reactions is illustrated in the classical reports of Meirowsky (Cologne, 1920) and the Salvarsan Committee of Munich, 1920.

These reports showed that the incidence of reaction definitely increased with increased dosage. While it is well established that toxic reactions, including death, occur at all dose levels, even following comparatively minute doses, in general (as stated by Kolmer (*10*)), the incidence of toxic reactions is greatly influenced by dosage. The qualitative phenomenon of arsphenamine reactions is manifested by the tendency of a specific type of reaction to occur at a higher incidence following a specific arsphenamine. It is, therefore, the quantitative index of that particular arsphenamine.

BLOOD DYSCRASIAS

Blood dyscrasias as a complication following arsphenamine therapy have been reviewed extensively by McCarthy and Wilson (*13*), Loveman (*14*), Falconer and Epstein (*15*), and Stokes, Beerman, and Ingraham (*16*). These reviews, citing a very extensive literature, definitely and conclusively agree that this phenomenon is not peculiar to any one of the arsphenamine products but every one has been shown to be capable of producing hematopoietic reactions (*16*).

Loveman, in the review of the general literature, traced the history of blood dyscrasias showing that inorganic arsenic, organic arsenic, and benzene products were capable of producing hemorrhagic and hematopoietic injury. Concerning the etiologic factor in cases of post-arsphenamine blood dyscrasias, Loveman suggests the probability that all play a part, the combination playing a greater role than any of the elements individually.

The blood dyscrasias following arsphenamine therapy, as classified by McCarthy and Wilson, are of two types, one a depression of the bone marrow function, and the other a toxic action on the platelets in the peripheral circulation. The thrombocytopenic type of reaction, they conclude, is of an "anaphylactoid" nature. It was noted that this reaction occurred in cases apparently rendered sensitive to the arsphenamines after treatment with a number of injections. Arsenic is believed to be the causative factor and not the benzene radical as there is no evidence of depression of the bone marrow function. Acute destruction of the platelets in the peripheral circulation with rapid regeneration is characteristic of this reaction.

Falconer and Epstein, studying purpura haemorrhagica following arsphenamine therapy, offer evidence to suggest that this reaction accompanied by varying degrees of shock is an allergic phenomenon rather than a toxic manifestation of the drug injected. The prompt loss of circulatory tone accompanying the reaction appears to be a vasomotor effect, with loss of capillary tone, dilatation of the capillary bed, and a rapid loss of platelets from the general circulation. A great number of these platelets can be returned promptly into the general circulation by injection of epinephrine.

The physiologic action of arsenic, reports Kolmer (*10*), is to produce paralysis of the capillaries with increased permeability, especially in vessels of the splanchnic area. This, he observes, has been known for years to be a well established fact in the pharmacology of arsenic and he cites the work of Ricker and Knape (1912) which showed by direct microscopic observations of the capillary bed in living animals that administration of the arsphenamines caused a slowing of the blood stream, dilatation of the capillaries, stasis, and hemorrhage.

A predisposed, weakened hematopoietic system (Loveman) or an abnormal change in the capillaries of the individual (Kolmer) are of great importance as a secondary factor in blood dyscrasias. Kahn (*17*) and Buxton (*18*) have observed that menstrual abnormality is present in practically all cases of blood dyscrasias in women. Menorrhagia is of outstanding diagnostic significance in cases of blood dyscrasias, especially purpura haemorrhagica. This suggests that females with menstrual disorders might possibly be poor risks for arsphenamine therapy.

BLOOD DYSCRASIAS AFTER SULFARSPHENAMINE

While blood dyscrasias have been reported following the use of all the arsphenamine products, and also arsenoxide, there is evidence to indicate that the incidence following sulfarsphenamine is higher than that following the other products.

In an evaluation of the three sulfarsphenamine products, bismuth arsphenamine sulfonate, sulfarsphenamine, and trisodium sulfarsphenamine, Stokes, Beerman, and Ingraham (*16*) noted the tendency toward hematopoietic accidents.

Clinical reports on the use of trisodium sulfarsphenamine and bismuth arsphenamine sulfonate are favorable. The reaction incidence is low but a tendency toward the hematopoietic reaction is reported. The reactions, however, are rare.

A review of 14 years' experience with bismarsen for the treatment of syphilis was reported by Beerman, Shaffer, and Livingood (*19*). The study reports the results of treatment of 823 syphilitic patients receiving 18,286 injections. The literature concerning the hemorrhagic reactions to bismarsen is reviewed. Bismarsen, the authors observed, is a relatively nontoxic and easily administered drug for the treatment of syphilis. Although it was frequently used in treating patients sensitive to the other arsenicals, the reaction incidence was low, only 5 cases each of arsphenamine dermatitis and purpura haemorrhagica occurring, with no fatalities. It is interesting to note that in the discussion of the study Combes (*20*) reported that he abandoned bismarsen because he "developed an aversion to preparations containing the sulfonate radical," whereas Appel's (*21*) experience

with this product has led him to rely on it in cases in which intravenous therapy is contraindicated.

Sulfarsphenamine, states Stokes (*16*) in his review, "exhibits the curious paradox of warm allegiance on the part of some undoubtedly competent observers, side by side with damnation from others equally competent."

CLINICAL REVIEW

Pfeiffer (*22*, *23*) reported satisfactory results with the use of sulfarsphenamine in Massachusetts and later in New York.

The Massachusetts report covered a period of 2 years in which sulfarsphenamine was used in various types and stages of syphilis in 20 different clinics and in 7 hospitals for mental diseases, over 15,000 doses being administered. The one adverse report stated that the only excuse for giving sulfarsphenamine was "inability to find veins." The observations reported sulfarsphenamine to be a safe (reactions not as frequent as with arsphenamine and neoarsphenamine) and a reliable drug to use in the treatment of syphilis and the drug of choice especially for the general practitioner.

The report on the use and status of sulfarsphenamine in New York State is more extensive than the Massachusetts survey. During the period from 1925 to 1934, the State distributed 159,034 gm. of sulfarsphenamine to hospitals, State institutions, clinics, and practicing physicians. The experience was satisfactory and at variance with that of some observers as to its value and dangers. A detailed statistical study of the reactions following sulfarsphenamine therapy in three clinics and one penal institution is reported. In the three clinics, 29,510 injections, of which all but 693 were intravenous, were administered to 920 patients in doses varying from 0.3 to 0.6 gm. In one clinic, 0.6 gm. twice weekly was used for a short time. It was found, however, that doses of 0.45 gm. gave good therapeutic results and fewer reactions. The case histories compiled by the Division of Vital Statistics of the State Health Department of New York showed that with the exception of purpura, which occurred six times, the reaction rates were lower than those reported for all arsenicals by the Cooperative Clinical Group. There were no cases of aplastic anemia, cerebral hemorrhage, or acute yellow atrophy of the liver, and there were no fatalities. At the penal institution, 8,198 intravenous injections averaging 0.72 gm. were administered during the period from 1929 to 1932. In the beginning the dose was 0.9 gm., without heavy metals, but later, in 1930, it was reduced to the maximum of 0.6 gm. The severe reactions reported were five cases of dermatitis, one of jaundice, and three deaths. In each of the three fatalities the dosage ranged from 0.6 to 0.9 gm., with a very high proportion, 68 percent, as the top figure.

The medical service of the United States Navy (*24*) during the period from 1925 to 1941 administered 30,834 injections of sulfarsphenamine, reporting 17 mild, 8 severe, and no fatal reactions. The reported reaction ratio is 1 in every 1,233 injections as compared with 1 to 1,362 injections of neoarsphenamine. No fatal reactions were reported following sulfarsphenamine, while the ratio of deaths to doses following neoarsphenamine was 1 to 27,101 injections. During the 4 years 1938–41 (*25*), 4,290 injections of sulfarsphenamine were administered without a single reported reaction. Of the total injections, only 293, approximately 7 percent, were administered to "active service personnel," and in 3,978 cases, over 92 percent, the dosage was less than 0.6 gm. It is apparent, therefore, that the record of this 4-year period refutes the criticism that the Navy experience is not a particularly good criterion because of the "good risk" of the naval personnel. The good record in these reports is possibly due to the treatment schedule.

Reports of the Cooperative Clinical Group (*7*), which included Cole's study (*29*), recorded that the reaction ratio following sulfarsphenamine therapy, 7,912 doses, was slightly lower in minor reactions but the major reaction rate (3.54 per 1,000 injections) was higher than that experienced with arsphenamine (2.17 per 1,000) and neoarsphenamine (2.43 per 1,000), principally because of the high incidence of dermatitis and purpura haemorrhagica.

The incidence for purpura following sulfarsphenamine was high, 0.76 per 1,000 injections, as compared with arsphenamine, 0.04 per 1,000, and neoarsphenamine, 0.16 per 1,000. Aplastic anemia as a complication of the therapy with neoarsphenamine and sulfarsphenamine occurred at practically the same rate, 0.10 and 0.13 for 1,000 injections respectively.

Aplastic anemia and purpura are recorded as occurring most frequently in white females. Of the 16 cases of purpura, 12 are reported in females, 10 of whom were white; the 4 cases of anemia were in white females.

Sulfarsphenamine, in doses never larger than 0.6 gm., was used a great deal (1923 to 1926, inclusive) but because of the reactions it has been almost entirely discarded. The proportion of fatalities was higher after sulfarsphenamine than after the other arsenical preparations.

In summarizing the results of the 5-year period from 1927–31, Osborne, Rickloff, and Butler (*26*) reported that 10 reactions—5 cases of jaundice, 3 of dermatitis, and 2 of purpura—occurred following 896 injections of sulfarsphenamine to adults. During the same period, 22,336 injections of arsphenamine were administered with 54 reactions—no instance of purpura, 28 cases of jaundice, and 26 of dermatitis, 2 of which were fatal. In adults, the authors felt, sulfarsphenamine is an

effective therapeutic agent but its use should be limited strictly to those individuals who present physical obstacles to intravenous therapy.

ICTERUS FOLLOWING ARSPHENAMINE THERAPY

Icterus as a manifestation of toxic complication following arsphenamine therapy is recorded in practically every compilation of arsenical reactions. The very extensive literature on the disorders of the liver following arsenical therapy has been reviewed by the British Salvarsan Committee (*8*), Lane (*27*), Mohr, Padget, and Moore (*28*), and Stokes, Beerman, and Ingraham (*16*).

Jaundice following arsenical therapy, observed Stokes, may be due to a number of causes. Arsenic is, of course, one of the direct causes, if not the principal factor, in hepatic injury due to arsphenamine therapy. The British Salvarsan Committee (*8*) reported that the incidence of jaundice and yellow atrophy increased following the introduction of salvarsan therapy in syphilis. It was the opinion of this Committee that this complication of treatment apparently was not due to toxic batches of the drug, nor to faulty technique of administration, but was more probably caused by the unwise pushing of the dosage, both as regards size of dose and frequency. It is the Committee's belief that it is the nature of the whole arsenobenzol drug, as an aminobenzol derivative, which causes the liver damage. Jaundice, says Kolmer (*10*), is to be ascribed primarily to the necrosis of liver cells by arsenic or to an exacerbation of syphilis lesions in the liver. It is Lane's opinion (*27*) that arsenic exerts an influence in most cases but is not the only factor in hepatic injury.

Cole (*29*) reported that icterus was more frequently experienced after neoarsphenamine therapy than after arsphenamine. The Cooperative Clinical Group report, of which Cole's is a part, found the icterus incidence practically the same for arsphenamine (1.16 per 1,000 injections) and neoarsphenamine (1.20 per 1,000), but slightly lower for sulfarsphenamine (0.88 per 1,000). The incidence in the white race (males 1.04 and females 1.31) was higher than in the colored race (males 0.83 and females 0.57). Stokes' review (*16*) cites Soffer, and Gott and Doyle as noting this racial difference.

RECENT LABORATORY STUDY ON SULFARSPHENAMINE

Recent studies on the stability of neoarsphenamine at the National Institute of Health (*30*) and the Division of Preventive Medicine, United States Navy (*31*), indicate that age has a direct influence on the stability of the drug (*30*), that the reaction expectancy increases with the age of the product (*31*), and that the "heat test" at 70° C.

offers a reliable and sensitive procedure for the determination of the stability of neoarsphenamine (*32*).

Similar studies (unpublished) were made on arsphenamine and sulfarsphenamine, and it was found that both of these drugs were more stable than neoarsphenamine.

As a result of these investigations the Public Health Service arsphenamine regulations (*33*) were amended to require more rigid stability and solubility ("heat") tests and to provide expiration dates (the date beyond which the contents of the package cannot be expected beyond reasonable doubt to yield their specific results) for all licensed arsphenamines. The expiration date for neoarsphenamine is 3 years, and for the other arsphenamines, including sulfarsphenamine, 5 years from the date of official release by the National Institute of Health.

Investigation of the therapeutic activity of sulfarsphenamine at the National Institute of Health, begun in 1938 and only recently completed, indicates that sulfarsphenamine is more effective than neoarsphenamine in curing rabbits infected with experimental syphilis. The sterilizing dose of sulfarsphenamine appears to be 30 mg. per kg. of body weight as compared with 40 mg. for neoarsphenamine.

On the basis of these animal experiments, it would appear that comparable clinical results in the therapy of syphilis might be expected with sulfarsphenamine and neoarsphenamine, in dosage ratio of 3 to 4 respectively. It would appear also that on the basis of equal dosage the reaction expectancy of sulfarsphenamine might be higher.

SUMMARY

This review indicates that reactions to the arsphenamines, including sulfarsphenamine, are due primarily to the arsenic content of the drug and secondarily to the aminophenol radical, or possibly to the combination of these factors. All types of reactions have been observed after each of the arsphenamines but there appears to be a tendency for definite types of reactions to occur more frequently with certain products. Purpura haemorrhagica, for instance, has been reported after all the arsphenamines, but there is evidence to indicate that after sulfarsphenamine it occurs more frequently. And, too, icterus appears more frequently after neoarsphenamine. Reactions incident to arsphenamine therapy are therefore quantitative, dependent on the quantity administered, and qualitative, according to the type of arsphenamine used.

Reactions following sulfarsphenamine therapy are in no way different from those following the other arsenicals, except in the tendency to be of specific type, and their excessive occurrence indicates that the dosage, size and frequency, is approaching the limit of tolerance.

It is suggested that the reputation of sulfarsphenamine as a dan-

gerous drug for use in adults is at least debatable. However a considerable part of the unfavorable clinical experience was obtained while the use of the drug in the therapy of syphilis was in the introductory or experimental stage. The continued satisfactory clinical reports of the United States Navy Medical Services and the recent laboratory studies appear to indicate that sulfarsphenamine products of more recent manufacture are superior, both with respect to efficacy and toxicity, to those of the earlier period.

It would appear from this survey that the whole question of the toxicity of sulfarsphenamine should be reinvestigated, and should it be determined that this drug is no more toxic than neoarsphenamine, its greater stability and ease of administration should increase its utilization in antisyphilitic therapy.

Hot Springs Neoarsphenamine-Sulfarsphenamine Study

The clinical facilities of the United States Public Health Service at Hot Springs, Ark., were made available for the reinvestigation of sulfarsphenamine, to determine whether, under comparable clinical

TABLE 1.—*Type and severity of reactions to neoarsphenamine and sulfarsphenamine*

Type of reaction	Neoarsphenamine (9,148 injections)							
	Severity of reaction							
	Mild		Moderate		Severe		Total	
	Number	Rate	Number	Rate	Number	Rate	Number	Rate
Minor:								
Gastrointestinal	171	18.69	64	7.00	10	1.09	245	26.78
Nitritoid	2	.22	2	.22	1	.11	5	.55
Pruritus	20	2.19	10	1.09	2	.22	32	3.50
Slight skin eruption	23	2.51	11	1.20	1	.11	35	3.83
Shock					2	.22	2	.22
Febrile	37	4.04	11	1.20	7	.77	55	6.01
Other	17	1.86	6	.66	5	.55	28	3.06
Edema of eyelids, face, or hands								
Fainted or faint feeling following injection	1	.11					1	.11
Cardiac distress and shortness of breath								
Pain in shoulders and wrist joints								
Nosebleed	1	.11					1	.11
Headache	10	1.09	5	.55	5	.55	20	2.19
Blind for few minutes after injection								
General malaise	2	.22	1	.11			3	.33
Dizziness	3	.33					3	.33
Total minor reactions	270	29.51	104	11.37	28	3.06	402	43.94
Major:								
Aplastic anemia					1	.11	1	.11
Arsenical stomatitis			1	.11			1	.11
Icterus	10	1.09	11	1.20	9	.98	30	3.28
Purpura haemorrhagica			3	.33	1	.11	4	.44
Agranulocytosis			1	.11	1	.11	2	.22
Hemorrhagic encephalitis			1	.11	1	.11	2	.22
Arsenical dermatitis	13	1.42	7	.77	4	.44	24	2.62
Unspecified	5	.55	2	.22			7	.77
Macular	1	.11					1	.11
Papular	5	.55	4	.44			9	.98
Maculopapular								
Papulovesicular	1	.11	1	.11	1	.11	3	.33
Vesicular								
Exfoliative					3	.33	3	.33
"Fixed" exanthems	1	.11					1	.11
Death					2	.22	2	.22
Total major reactions	23	2.51	24	2.62	19	2.08	66	7.21
Total reactions	293	32.03	128	13.99	47	5.14	468	51.16

TABLE 1.—*Type and severity of reactions to neoarsphinamine and sulfarsphenamine*—Continued

Type of reaction	Sulfarsphenamine (7,730 injections)							
	Severity of reaction							
	Mild		Moderate		Severe		Total	
	Number	Rate	Number	Rate	Number	Rate	Number	Rate
Minor:								
Gastrointestinal	116	15.01	81	10.48	9	1.16	206	26.65
Nitritoid	2	.26	4	.52	1	.13	7	.91
Pruritus	29	3.75	13	1.68	2	.26	44	5.69
Slight skin eruption	51	6.60	8	1.03			59	7.63
Shock	4	.52			1	.13	5	.65
Febrile	22	2.85	5	.65	4	.52	31	4.01
Other	22	2.85	7	.91	1	.13	30	3.88
Edema of eyelids, face, or hands	3	.39					3	.39
Fainted or faint feeling following injection	4	.52					4	.52
Cardiac distress and shortness of breath	2	.26					2	.26
Pain in shoulders and wrist joints					1	.13	1	.13
Nosebleed			1	.13			1	.13
Headache	10	1.29	6	.78			16	2.07
Blind for few minutes after injection	1	.13					1	.13
General malaise	2	.26					2	.26
Dizziness								
Total minor reactions	246	31.82	118	15.27	18	2.33	382	49.42
Major:								
Aplastic anemia					1	.13	1	.13
Arsenical stomatitis								
Icterus	3	.39	2	.26	3	.39	8	1.03
Purpura haemorrhagica	10	1.29	4	.52	8	1.03	22	2.85
Agranulocytosis	1	.13			2	.26	3	.39
Hemorrhagic encephalitis								
Arsenical dermatitis	11	1.42	11	1.42	2	.26	24	3.10
Unspecified	3	.39	1	.13			4	.52
Macular			2	.26			2	.26
Papular	3	.39	6	.78			9	1.16
Maculopapular	1	.13					1	.13
Papulovesicular	2	.26			1	.13	3	.39
Vesicular	1	.13					1	.13
Exfoliative	1	.13	2	.26	1	.13	4	.52
"Fixed" exanthems								
Death					2	.26	2	.2
Total major reactions	25	3.23	17	2.20	18	2.33	60	7.76
Total reactions	271	35.06	135	17.46	36	4.66	442	57.18

conditions, the incidence of reactions, severity, etc., are greater than with neoarsphenamine therapy.

The several brands of neoarsphenamine and sulfarsphenamine were used. The two arsenicals of the same brand were administered concurrently, and after approximately 1,000 doses of each, the brand was changed. The treatment procedure—size and frequency of dosage, method of administration, concentration of solution, etc.—was the same for both products. The patients, irrespective of the stage of syphilis, race, age, or sex, were entered for the type of arsphenamine on the basis of alternate case selection and maintained on the particular arsenical during the study.

The investigation was instituted in January 1940, and was continued for approximately 18 months. During this period 16,878 intravenous injections of the arsphenamines were administered, of which 9,148 were neoarsphenamine and 7,730 were sulfarsphenamine.

The type and frequency of reactions observed following injections of neoarsphenamine and sulfarsphenamine are shown in table 1. These

reactions have been divided into two main groups: (1) minor reactions, under which are included gastrointestinal, nitritoid, pruritus, slight skin eruptions, shock, febrile, and other (headache, nosebleed, dizziness, etc.), and (2) major reactions, under which are included aplastic anemia, arsenical stomatitis, icterus, purpura haemorrhagica, agranulocytosis, hemorrhagic encephalitis, arsenical dermatitis, and death. In addition to these two main groupings, each type of reaction has been classified as mild, moderate, or severe.

The difference in minor reactions, 43.9 per 1,000 injections of neoarsphenamine and 49.4 per 1,000 injections of sulfarsphenamine, was not statistically significant. This was also true in the group of major reactions, the rate per 1,000 injections being 7.2 for neoarsphenamine and 7.8 for sulfarsphenamine.

Although the differences in total minor and total major reactions were not statistically significant, pruritus and slight skin eruptions in the minor group were observed more frequently following sulfarsphenamine; in the major group icterus was observed more frequently following neoarsphenamine (3.28 to 1.03 per 1,000 injections) and purpura haemorrhagica was more frequent after sulfarsphenamine (2.85 to .44 per 1,000 injections).

Four deaths occurred after treatment, two following treatment with neoarsphenamine and two following treatment with sulfarsphenamine. The cause of death in one of the two patients receiving neoarsphenamine, both females, was hemorrhagic encephalitis, no autopsy; in the other, the clinical diagnosis was agranulocytosis and aplastic anemia, confirmed by histopathologic examination. Both the fatalities reported as being caused by sulfarsphenamine offer points of interest incident to the therapy.

J. Mc.—Male. A patient with long-standing neurosyphilis had received 16 doses of 0.4 gm. each of sulfarsphenamine during this course of treatment. At the time of his last treatment he had developed what he thought were chigger bites on his legs and failed to report the condition, contrary to clinic instructions. He died 9 days after the appearance of hemorrhages, 3 days after the last treatment. The clinical diagnosis was acute purpura haemorrhagica, and the histopathologic report was meningeal and cerebral hemorrhage, petechial hemorrhage in kidney and stomach, syphilitic aortitis with focal arteriosclerosis, acute splenitis.

R. D. H.—Female. This patient, who had a mixed infection of gonorrhea and syphilis, was receiving concurrent therapy of sulfarsphenamine and sulfanilamide. During the period from February 16, 1940, to August 21, 1940, she received 2,660 gr. of sulfanilamide. The last sulfarsphenamine was administered on August 20 at which time she developed purpura haemorrhagica and aplastic anemia. The patient died September 20. Permission for autopsy was not granted.

Although this case is recorded as a death due to sulfarsphenamine, there is serious question whether the combined therapy, or one of the drugs individually, was the primary cause of death, since either drug is capable of producing blood dyscrasia.

An additional fatal case, M. B. B., white female, not recorded as part of the study, occurred 3 months after the third injection of 0.2 gm. of sulfarsphenamine. Her history disclosed a previous reaction, "bruised areas" on legs, following neoarsphenamine and on admission she had anemia and also menorrhagia of at least 1 year's duration. The histopathologic examination confirmed the clinical diagnosis of purpura haemorrhagica and reported also chronic endometritis but questioned the role that sulfarsphenamine played in the condition. This case is reported, even though it is not a part of the study, because it illustrates the dangers of arsenic therapy in patients with weakened hematopoietic systems, particularly females with menstrual disorders.

The patients were treated under two procedures with arsenical therapy, (1) two injections a week with dosage varying from 0.2 to 0.35 gm., and (2) one injection a week with dosage from 0.35 to 0.6 gm. The average total weekly dose per patient was approximately the same under both procedures.

Some very high doses (in a study of the Herxheimer reaction) and some very small doses (to reactors) were administered. As would be expected, the reaction rate was high.

In the group receiving neoarsphenamine, twice as many reactions occurred in patients receiving one treatment a week as in those receiving two injections weekly. Among those receiving one treatment a week, reactions occurred as follows: Minor reactions, 47.4 per 1,000 injections, major reactions 7.5 per 1,000; among those receiving two injections a week, the observed reactions were: minor reactions 20.8 and major reactions 4.7 per 1,000 injections. In general this same quantitative relation in the reaction rate was found to exist between the two methods of treatment at the several comparable dose levels. In the sulfarsphenamine group, patients receiving one weekly injection reported one-third more minor and twice as many major reactions as did patients receiving two injections per week (minor 44.3, major 9.6, total 53.8 to minor 33.9, major 4.5, total 38.4 per 1,000, respectively). At several dose levels inconsistent results were noted which were due to unequal distribution of the highly reactive white females.

Icterus. (2.5 per 1,000 injections) after neoarsphenamine occurred more frequently than purpura (0.5) following sulfarsphenamine in the cases receiving two treatments a week. In the patients receiving one injection a week both types of reactions occurred at higher and approximately equal rates (3.7 and 4.1, respectively).

In addition to the arsenicals, practically all patients received concurrent bismuth injections; consequently it is impossible to determine

the influence of bismuth on the frequency of reactions. Some patients received two arsenical and one bismuth injection a week; others received two bismuth and one arsenical. A few were treated intensively, receiving two arsenical and two bismuth injections a week during the first course. It was interesting to note that the administration of bismuth and arsenical on the same day resulted in an extremely high rate of minor reactions, particularly with neoarsphenamine, but the major reaction rate was not influenced.

Sulfonamide was administered concurrently (either simultaneously or within 1 month preceding arsenical injections) with the arsenical and bismuth therapy in a number of cases with syphilis and gonorrhea.

TABLE 2.—*Effect of sulfonamide drugs on frequency and severity of reactions*

Reactions per 1,000 injections	Sulfonamides administered within month preceding injection					
	Yes		No		Total[1]	
	Number	Rate	Number	Rate	Number	Rate
Neoarsphenamine:						
Minor reactions	52	44.4	344	44.1	402	43.9
Major reactions	7	6.0	55	7.1	66	7.2
Total reactions	59	50.4	399	51.2	468	51.2
Icterus	3	2.6	25	3.2	30	3.3
Purpura haemorrhagica	-----------	-----------	4	.5	4	.4
Total injections	1,170		7,798		9,148	
Sulfarsphenamine:						
Minor reactions	41	41.9	333	50.3	382	49.4
Major reactions	12	12.3	47	7.1	60	7.8
Total reactions	53	54.2	380	57.4	442	57.2
Icterus	1	1.0	7	1.1	8	1 0
Purpura haemorrhagica	6	6.1	16	2.4	22	2.8
Total injections	978		6,621		7,730	

[1] Includes unknown data on sulfonamide treatment.

Concurrent treatment with neoarsphenamine showed no significant influence, as the reaction rates for the combined therapy (minor 44.4, major 6.0 per 1,000) and with neoarsphenamine alone (minor 44.1, major 7.1 per 1,000) were not statistically different. With sulfarsphenamine the minor rate was slightly lower for the combined therapy (41.9) than with sulfarsphenamine alone (50.3), but major reactions were materially higher following concurrent therapy (12.3 to 7.1). In the combined therapy group, blood dyscrasias (9.2)—aplastic anemia (1.0), agranulocytosis (2.0), and purpura (6.1)—occurred at significantly higher rates than in the group receiving sulfarsphenamine without sulfonamide (2.6)—agranulocytosis (0.2), purpura (2.4).

Icterus after neoarsphenamine occurred at a slightly lower rate (2.6 per 1,000) after combined therapy than with the arsenical alone (3.2). As noted above, purpura in the sulfarsphenamine-sulfona-

mide group (6.1) was two and one-half times more frequent than when sulfarsphenamine (2.4) was administered alone.

Both the type and frequency of reactions seemed to vary according to race and sex of the patients. Females in each race experienced more minor reactions than males both in the neoarsphenamine and sulfarsphenamine groups. In the neoarsphenamine group, minor reactions occurred more frequently in white males than in colored males. In comparing minor reactions following the two drugs, the only significant difference was observed in colored males who had more reactions following sulfarsphonamine than following neoarsphenamine.

TABLE 3.—*Reactions in patients treated with neoarsphenamine and sulfarsphenamine, shown by race and sex*

Reactions per 1,000 injections	Males						Females					
	White		Colored		Total		White		Colored		Total	
	Number	Rate	Number	Rate	Number	Rate	Number	Rate	Number	Rate	Number	Rate
Neoarsphenamine:												
Minor reactions	117	41 1	72	28.6	189	35.2	107	56.3	106	56.2	213	56.3
Major reactions	30	10 5	11	4.4	41	7.6	10	5.3	15	8.0	25	6.6
Total reactions	147	51 7	83	33.0	230	42 9	117	61.6	121	64.2	238	62.9
Icterus	18	6.3	6	2.4	24	4.5	3	1.6	3	1.6	6	1.6
Purpura haemorrhagica	2	.7	1	.4	3	.6	-----	-----	1	.5	1	.3
Total injections	2,845		2,518		5,363		1,900		1,885		3,785	
Sulfarsphenamine:												
Minor reactions	81	34.1	96	45.3	177	39.3	86	54.9	119	71.5	205	63.4
Major reactions	18	7 6	7	3.3	25	5.6	27	17.2	8	4.8	35	10.8
Total reactions	99	41.6	103	48.6	202	44.9	113	72.2	127	76.3	240	74.3
Icterus	2	.8	1	.5	3	.7	5	3.2	-----	-----	5	1.5
Purpura haemorrhagica	4	1.7	2	.9	6	1.3	14	8.9	2	1.2	16	5.0
Total injections	2,378		2,121		4,499		1,566		1,665		3,231	

White females suffered more severe reactions following the use of sulfarsphenamine than colored females or males of either race. In fact, the rate per 1,000 injections was more than twice as high in this group as in the white males who had the next highest rate (17.2 to 7.6 per 1,000 injections). This rate of 17.2 was also more than three times as great as the rate for white females following neoarsphenamine. The rate of 7.6 for white males following sulfarsphenamine was more than twice the rate for colored males (3.3). In the neoarsphenamine group the differences between race and sex were not as marked. Although more severe reactions were observed in white males, the only significant difference statistically was between the white and colored males. Here the rates were, respectively, 10.5 and 4.4 per 1,000 injections.

Icterus as a major complication of therapy was reported in 38

instances and purpura haemorrhagica was observed in 26 patients, 2.25 and 1.54 per 1,000 injections, respectively.

Of the 38 cases of icterus, 30 (3.28 per 1,000 injections) occurred following neoarsphenamine therapy and 8 (1.03) after sulfarsphenamine. Twenty-seven of the 38 reactions occurred in males; of these 24 (4.5) followed neoarsphenamine and 3 (0.7) sulfarsphenamine. Eleven cases were in females, and of these 6 (1.6) followed neoarsphenamine and 5 (1.5) sulfarsphenamine.

Purpura haemorrhagica was reported in 26 patients; of these 4 (0.44) followed neoarsphenamine therapy and 22 (2.85) sulfarsphenamine. In males 9 (0.91) reactions were recorded, 3 (0.6) following neoarsphenamine and 6 (1.3) sulfarsphenamine. Of the 17 (2.42) reactions occurring in females, 1 (0.3) was due to neoarsphenamine and 16 (5.0) to sulfarsphenamine. The incidence in white females (8.9) was materially higher than in colored females (1.2).

TABLE 4.—*Reactions in patients treated with neoarsphenamine and sulfarsphenamine by age of patient*

Reactions per 1,000 injections	Age of patient									
	15–24		25–34		35–44		45 and over		Total	
	Number	Rate	Number	Rate	Number	Rate	Number	Rate	Number	Rate
Neoarsphenamine:										
Minor reactions	170	43 5	118	39 5	67	59 1	35	43.9	402	43 9
Major reactions	31	7 9	21	7 0	11	9.7	1	1.3	66	7 2
Total reactions	201	51 5	139	46 5	78	68.8	36	45.1	468	51.2
Icterus	16	4.1	7	2 3	7	6.2			30	3 3
Purpura haemorrhagica	1	.3	2	.7			1	1.3	4	.4
Total injections	3,904		2,990		1,133		798		9,148	
Sulfarsphenamine:										
Minor reactions	182	55 6	121	45 4	49	45 1	25	47 6	382	49 4
Major reactions	24	7.3	16	6.0	12	11.0	7	13.3	60	7.8
Total reactions	206	62 9	137	51.3	61	56 1	32	61.0	442	57.2
Icterus	4	1.2	3	1.1			1	1.9	8	1 0
Purpura haemorrhagica	7	2.1	7	2 6	5	4.6	3	5.7	22	2.8
Total injections	3,274		2,668		1,087		525		7,730	

It is evident, therefore, that icterus following neoarsphenamine in males (4.5)—especially white males (6.3)—and purpura haemorrhagica following sulfarsphenamine therapy in females (5.0)—white females (8.9)—are serious complications in the therapy of syphilis. However, conclusions relative to the incidence of purpura following sulfarsphenamine should be evaluated in the light of its high incidence in concurrent therapy with sulfonamide, as previously noted.

The data were analyzed to determine the influence of the age of the patients and the stage of syphilis upon the frequency and severity of reactions. Among the various age groups, the only significant difference was noted in the group 45 years or over. Here the rate of severe reactions per 1,000 injections was 1.3 for neoarsphenamine and 13.3 for

sulfarsphenamine. Icterus as a major complication of neoarsphenamine is recorded in the first three age groups (15–24, 25–34, 35–44) as 4.1, 2.3, and 6.2 per thousand, but is not reported in the group 45 and over; the incidence of purpura following sulfarsphenamine, increasing with the age of the patient, 2.1, 2.6, 4.6, and 5.7 per 1,000 injections, respectively, was highest in the oldest age group, 45 and over.

Previous treatment is a factor influencing reactions following arsenical therapy. The minor reactions were materially higher after both drugs in patients classed as reactors to previous treatment. The major reactions to sulfarsphenamine were higher in patients who had been previously treated; with neoarsphenamine the incidence was slightly greater in the "no previous treatment" group.

Icterus following neoarsphenamine occurred at approximately the same rate in the three groups, slightly lower in nonreactors. The incidence of purpura after sulfarsphenamine was lowest in "no previous treatment" cases and highest among the reactors.

The influence of the dose sequence on the reaction rate was determined for those patients who were either untreated or had no treatment for at least 6 months prior to inclusion in the study.

The minor reaction rate in both drug groups decreased with each successive dose following a peak after the first injection, with a slight rise at the beginning of each course. The major reaction rate with neoarsphenamine during the first two courses, 8.1 and 7.9, respectively, was approximately the same, with a decrease (5.9) in the third course; with sulfarsphenamine there was a progressive increase with each succeeding course—3.6, 10.7, and 21.2, respectively.

As will be noted, the significant observation is the transposition from the low incidence of major reactions with sulfarsphenamine and high rate with neoarsphenamine in the first course to high rate with sulfarsphenamine and low incidence following neoarsphenamine in the third course of treatments.

The data were processed to determine what influence, if any, the discontinuance of therapy of either drug might have on the final computations. The tabulation determined the percentage of cases in which neoarsphenamine and sulfarsphenamine, in order named, were discontinued following the first, second, or third reaction (minor or major). When the reaction was minor, the drugs were withdrawn following the first reaction in 8 and 14 percent of the cases, after the second reaction in 15 and 20 percent, and after the third reaction in 27 and 29 percent, respectively. Therapy was terminated in 12 percent of the mild reactions to neoarsphenamine and 17 percent of those to sulfarsphenamine. In the case of major reactions the drugs were discontinued in 72 and 67 percent of the cases after the first reaction, in 75 and 83 percent reacting the second time, and following the third reaction in 80 and 100 percent, respectively. In approximately 75

percent of the major reactions to both drugs further treatment was abandoned. Although the differences in percentages are not great, treatment was discontinued more frequently when sulfarsphenamine caused the reaction. This precaution on the part of the physicians administering the drugs may have lowered the rate of severe reactions to sulfarsphenamine.

OBSERVATIONS AND CONCLUSIONS

This study presents a clinical comparison of the reactivity of neoarsphenamine and sulfarsphenamine in the treatment of syphilis. In general the clinical material was representative of the class in which venereal disease is probably highest; approximately one-eighth had mixed infections of gonorrhea and syphilis and might be considered "bad risks" for arsenical therapy because of their impoverished condition upon admission to the clinic. The reaction rate was consequently high and therefore comparison of these results with other reports on the reactivity of the arsphenamines must be evaluated on the basis of the clinical material available in each study.

The reaction rate for neoarsphenamine (minor 43.9, major 7.2 per 1,000 injections) is only slightly less than that for sulfarsphenamine (minor 49.2, major 7.8 per 1,000), and the difference is not statistically significant. These results are materially higher than the reaction incidence reported by the Cooperative Clinical Group for neoarsphenamine (minor 13.7, major 2.43 per 1,000) and sulfarsphenamine (minor 11.4, major 3.54 per 1,000). In this study the minor reaction rate was slightly higher for sulfarsphenamine than for neoarsphenamine, but in the Cooperative Clinical Group report the reverse was true. In the major reactions, however, the rate was approximately 50 percent higher for sulfarsphenamine in the Cooperative Clinical Group study, whereas in this report the rate for neoarsphenamine and sulfarsphenamine is the same.

Although the total rates are approximately the same, sulfarsphenamine appears to be a particularly toxic drug in white females. The rate of major reactions in this group (17.2) was more than twice the next highest rate (7.6) which was observed in white males following sulfarsphenamine; and more than 60 percent greater than the highest rate of major reactions following neoarsphenamine (10.5 per 1,000 injections in white males).

In the minor reactions gastrointestinal (26.8 per 1,000) and febrile (6.0) occurred most often following neoarsphenamine therapy; in the sulfarsphenamine group gastrointestinal (26.6), slight skin eruption (7.6) and pruritus (5.7) were most frequently encountered. With neoarsphenamine therapy, icterus (3.3) and dermatitis (2.6) were the major reactions of importance; with sulfarsphenamine, dermatitis (3.1) and purpura haemorrhagica (2.9). The significant observation of the comparative study of reactivity of neoarsphenamine and

sulfarsphenamine is that icterus occurred most frequently after neoarsphenamine, and purpura most frequently after sulfarsphenamine.

The incidence of icterus was highest in males (4.5 per 1,000 injections), especially in whites (6.3) receiving neoarsphenamine, and, in general, in the younger age groups.

Purpura haemorrhagica was reported at the highest incidence in females (5.0), especially whites (8.9), after sulfarsphenamine; the incidence increased with the age of the patient.

Concurrent treatment with sulfonamide and neoarsphenamine had no influence on the reaction rates, but combined with sulfarsphenamine the incidence of purpura haemorrhagica (6.1) was two and one-half times more frequent than when sulfarsphenamine (2.4) was administered alone.

Sulfarsphenamine is less toxic in patients receiving the first course of therapy than is neoarsphenamine; but, conversely, neoarsphenamine is less toxic than sulfarsphenamine in patients receiving the second and especially the third courses of therapy.

Laboratory investigations indicate that sulfarsphenamine is definitely more stable than neoarsphenamine, and apparently treponemicidally more active than neoarsphenamine, ratio of 3 to 4, respectively. On the basis of animal experiments, it is suggested that sulfarsphenamine may be clinically more effective than neoarsphenamine.

REFERENCES

(*1*) U. S. Public Health Service: Proceedings of Conference on Venereal Disease Control Work. Supplement No. 3, Ven. Dis. Inform., Washington, 1936.
(*2*) Voegtlin, C., and Johnson, J. M.: The preparation of sulfarsphenamine. J. Am. Chem. Soc., **44**: 2573 (1922).
(*3*) Voegtlin, C., Dyer, H. A., and Thompson, J. W.: An arsphenamine derivative suitable for subcutaneous administration. Am. J. Syph., **6**: 526 (1922).
(*4*) Voegtlin, C., Smith, M. I., Dyer, H. A., and Thompson, J. W.: Penetration of arsenic into the cerebrospinal fluid. Pub. Health Rep., **38**: 1003 (1923).
(*5*) Voegtlin, C., Armstrong, C., and Dyer, H. A.: The curative action of sulpharsphenamine in experimental syphilis. Pub. Health Rep., **38**: 1815 (1923).
(*6*) Voegtlin, C., and Dyer, H. A.: Sterilizing efficiency of arsphenamine, neoarsphenamine, and sulpharsphenamine in experimental syphilis. Pub. Health Rep., **42**: 176 (1927).
(*7*) Cole, H. N., Moore, J. E., O'Leary, P. A., Stokes, J. H., Wile, U. J., Clarke, T., Parran, T., and Usilton, L. J.: Cooperative clinical studies on the treatment of syphilis. Arsenical reactions. Ven. Dis. Inform., **14**: 173 (1933).
(*8*) Report of the Salvarsan Committee. Toxic effects following the employment of arsenobenzol preparations. Great Britain Med. Res. Com., No. 66, London, 1922.
(*9*) Sollmann, T.: Pharmacology. 6th ed. Saunders, Phila., 1942.
(*10*) Kolmer, J. A.: Chemotherapy. With special reference to treatment of syphilis. Saunders, Phila., 1926.
(*11*) Cook, S. S.: Post-mortem findings in fatalities due to the use of the arsphenamine group. Pub. Health Rep., **51**: 927 (1936).
(*12*) Hahn, R. D.: Antisyphilitic treatment: mortality statistics. Am. J. Syph., Gonor. and Ven. Dis., **25**: 659 (1941).
(*13*) McCarthy, F. P., and Wilson, R.: The blood dyscrasias following the arsphenamines. J. Am. Med. Assoc., **99**: 1557 (1932).
(*14*) Loveman, A. B.: Toxic granulocytopenia, purpura haemorrhagica and aplastic anemia following the arsphenamines. Ann. Int. Med., **5**: 1238 (1932).

(15) Falconer, E. H., and Epstein, N. N.: Purpura haemorrhagica following neoarsphenamine and bismuth therapy. Arch. Int. Med., 65: 1158 (1940).
(16) Stokes, J. H., Beerman, H., and Ingraham, N. R.: The trivalent arsenicals in syphilis: Some recent advances, comparisons and evaluations. Am. J. Med. Sci., 201: 611 (1941). Part II. Treatment reactions. 202: 606 (1941).
(17) Kahn, M. F.: Abnormal uterine bleeding in blood dyscrasias. J. Am. Med. Assoc., 99: 1563 (1932).
(18) Buxton, C. L.: Menorrhagia as a primary factor in various blood dyscrasias. Am. J. Obstet. and Gynec., 42: 502 (1941).
(19) Beerman, H., Shaffer, B., and Livingood, C. S.: Bismarsen (bismuth arsphenamine sulfonate) for the treatment of syphilis. Review of 14 years' experience. J. Am. Med. Assoc., 120: 333 (1942).
(20) Combes, F. C.: Abstract of discussion on syphilis. J. Am. Med. Assoc., 120: 346 (1942).
(21) Appel, B. A.: Abstract of discussion on syphilis. J. Am. Med. Assoc., 120: 347 (1942).
(22) Pfeiffer, A.: Sulfarsphenamine in the treatment of syphilis. Medical Times, 53: 62 (1925).
(23) ————: Sulpharsphenamine: Its use and status in New York State. N. Y. State J. Med., 35: 13 (1935).
(24) Stephenson, C. S., Chambers, W. M., and Anderson, L. T.: Toxic effects of arsenical compounds. U. S. Naval Med. Bull., 40: 1015 (1942).
(25) ————: U. S. Naval Med. Bull., 38: 126 (1940), 39: 139 (1941), 40: 215 (1942), 41: 259 (1943).
(26) Osborne, E. D., Rickloff, R. J., and Butler, M. G.: An evaluation of the arsphenamines for general use with special reference to sulpharsphenamine. N. Y. State J. Med., 33: 753 (1933).
(27) Lane, C. G.: Jaundice occurring during treatment of syphilis. Arch. Dermat. and Syph., 39: 278 (1939).
(28) Mohr, C. F., Padget, P., and Moore, J. E.: Syphilis: Review of the recent literature. Arch. Int. Med., 66: 1112 (1940).
(29) Cole, H. N., DeWolf, H., McCuskey, J. M., Miskiian, H. G., Williamson, G. S., Rauschkolb, J. R., Ruch, R. O., and Clark, T.: Toxic effects following use of the arsphenamines. J. Am. Med. Assoc., 97: 897 (1931).
(30) Probey, T. F., and Harrison, W. T.: The effect of moisture and age on stability of neoarsphenamine. Pub. Health Rep., 53: 939 (1938).
(31) Stephenson, C. S., Probey, T. F., and Harrison, W. T.: The effect of the age of neoarsphenamine on reaction expectancy. Pub. Health Rep., 53: 945 (1938).
(32) Probey, T. F., and Harrison, W. T.: The effect of artificial temperatures on stability of neoarsphenamine. Pub. Health Rep., 54: 228 (1939).
(33) U. S. Public Health Service: Regulations for the control of the manufacture, importation, and sale of arsphenamine and its derivatives. Misc. Pub. No. 31, Washington, 1938.

PREVALENCE OF COMMUNICABLE DISEASES IN THE UNITED STATES

April 23–May 20, 1944

The accompanying table summarizes the prevalence of nine important communicable diseases, based on weekly telegraphic reports from State health departments. The reports from each State for each week are published in the Public Health Reports under the section "Prevalence of disease." The table gives the number of cases of these diseases for the 4 weeks ended May 20, 1944, the number reported for the corresponding period in 1943, and the median number for the years 1939–43.

DISEASES ABOVE MEDIAN PREVALENCE

Measles.—The number of cases of measles dropped from 126,484 during the preceding 4 weeks to 104,755 during the 4 weeks ended May 20. The number of cases was about 11,000 more than might normally be expected, the 1939–43 median being approximately 93,000 cases. Each geographic region except the New England and Mountain reported a comparatively high incidence. The largest excesses over the median occurred in the West South Central and Pacific regions; in each of those regions the number of cases was about 2.6 times the 5-year median.

Meningococcus meningitis.—For the 4 weeks ended May 20 there were 1,636 cases of meningococcus meningitis reported, a decline of about 300 cases from the preceding 4-week incidence. Compared with preceding years the current incidence was about 25 percent below the 1943 figure for this period, but it was more than 9 times the 1939–43 median. The incidence was higher than in 1943 in the East North Central, West North Central, and West South Central regions, but other regions reported very significant declines. Compared with the preceding 5-year median, however, every section of the country reported an excess, the largest excess occurring in the East North Central region and the smallest in the South Atlantic region. This disease has maintained an unusually high level since the beginning of 1941, with approximately 18,000 cases reported for the year 1943, which was the highest on record. For the first 20 weeks of 1944 there have been 10,270 cases reported, as compared with 9,849 cases for the same weeks in 1943.

Poliomyelitis.—There were 105 cases of poliomyelitis reported for the current 4-week period, as compared with 118 for the corresponding period in 1943 and a 5-year median of 73 cases. The increase seemed to be mostly due to an excess of cases in the West South Central and Pacific regions; Louisiana in the former region reported 15 cases, as compared with a 5-year median of 2 cases, and California in the latter region reported 24 cases as against a 5-year median of 13 cases.

Scarlet fever.—For the 4 weeks ended May 20 there were 25,698 cases of scarlet fever reported. In 1943 there were 13,612 cases reported for the corresponding 4 weeks; the preceding 5-year median was represented by the 1943 figure. Every section of the country contributed to the comparatively high incidence of this disease. In the South Atlantic and Pacific regions the numbers of cases were about

Number of reported cases of 9 communicable diseases in the United States during the 4-week period April 23–May 20, 1944, the number for the corresponding period in 1943, and the median number of cases reported for the corresponding period, 1939–43

Division	Current period	1943	5-year median	Current period	1943	5-year median	Current period	1943	5-year median
	Diphtheria			Influenza [1]			Measles [2]		
United States	770	780	856	5,210	6,337	6,337	104,755	108,057	93,056
New England	27	18	26	78	4	14	8,089	10,317	9,550
Middle Atlantic	96	120	140	28	96	82	14,927	30,675	12,447
East North Central	117	194	157	323	352	352	19,422	33,719	11,276
West North Central	53	36	75	102	116	116	7,512	7,756	7,336
South Atlantic	143	107	147	1,399	1,672	2,012	14,683	6,866	7,852
East South Central	57	52	64	388	709	517	2,269	3,062	1,635
West South Central	120	124	158	2,245	2,156	2,156	15,429	3,310	5,873
Mountain	58	42	50	403	461	476	3,724	5,039	4,324
Pacific	99	87	67	244	471	376	18,700	7,313	7,313
	Meningococcus meningitis			Poliomyelitis			Scarlet fever		
United States	1,636	2,228	181	105	118	73	25,698	15,612	15,612
New England	83	228	11	6	1	1	2,252	2,773	1,206
Middle Atlantic	401	630	48	5	9	8	6,049	4,104	4,590
East North Central	412	313	20	6	14	8	7,115	4,013	4,189
West North Central	154	133	11	6	4	4	2,684	1,153	1,141
South Atlantic	189	376	45	18	3	16	2,425	1,104	718
East South Central	133	205	32	7	12	11	642	339	411
West South Central	106	90	23	26	19	11	658	319	299
Mountain	29	53	5	3	12	5	1,087	1,001	437
Pacific	129	200	8	28	44	14	2,786	806	771
	Smallpox			Typhoid and paratyphoid fever			Whooping cough [2]		
United States	48	93	218	343	286	384	7,061	16,934	15,291
New England	0	0	0	18	36	27	577	1,110	1,605
Middle Atlantic	0	0	0	29	44	56	1,008	2,640	3,100
East North Central	16	51	51	39	25	49	913	3,367	3,367
West North Central	8	14	84	10	15	19	343	1,143	573
South Atlantic	4	3	7	71	51	89	1,467	2,657	2,357
East South Central	6	9	15	40	25	48	468	641	673
West South Central	4	9	27	70	46	57	1,172	2,658	1,623
Mountain	1	5	8	9	25	21	536	560	758
Pacific	9	2	20	57	19	25	577	2,158	2,103

[1] Mississippi and New York excluded; New York City included.
[2] Mississippi excluded.

3½ times the 1939–43 median. The smallest excess (about 30 percent) was reported from the Middle Atlantic region.

DISEASES BELOW MEDIAN PREVALENCE

Diphtheria.—The incidence of diphtheria continued relatively low during the 4 weeks ended May 20. While the number of cases (770) was only slightly lower than the number reported during the corresponding week in 1943, it was about 10 percent below the 1939–43 median. The situation was comparatively favorable in all sections of the country except the Pacific, where the number of cases (99) represented an increase over the normal expectancy of almost 50 percent.

Influenza.—The number of cases of influenza reported for the current period was 5,210, as compared with 6,337 in 1943. The 1939–43 median was represented by the 1943 figure. In the New England

region, while the number of cases (78) was not large, it was about 5 times the preceding 5-year median, and in the West South Central region the incidence was slightly above the normal seasonal level; in all other regions the number of cases was relatively low.

Smallpox.—The number of cases (48) of smallpox reported was about one-half of the number reported for the corresponding weeks in 1943 and less than 25 percent of the 1939–43 median (218 cases). The situation was favorable in all sections of the country.

Typhoid and paratyphoid fever.—The incidence (343 cases) of this disease was about 20 percent above the incidence for the corresponding period in 1943, but it was about 10 percent below the preceding 5-year median. A comparison of geographic regions shows that the incidence was below the normal seasonal level in all regions except the West South Central and Pacific; Louisiana and Texas in the West South Central region and California in the Pacific seemed mostly responsible for the excess incidence in those regions. California reported 55 cases, as compared with a median of 19 cases for the preceding 5 years.

Whooping cough.—The incidence of this disease was also relatively low, 7,061 cases being reported for the current 4-week period, as compared with the 1939–43 median of 15,291 cases. Each section of the country shared in this favorable situation. In the East South Central, West South Central, and Mountain regions the numbers of cases were about 70 percent of the median, in the West North Central and South Atlantic regions the numbers were about 60 percent of the median, and in each of the other regions the incidence was less than 35 percent of the normal seasonal expectancy. For the country as a whole the number of cases was the lowest recorded in the 7 years for which data are available.

MORTALITY, ALL CAUSES

An average of approximately 9,000 deaths from all causes per week was reported to the Bureau of the Census by 93 cities in the United States during the 4 weeks ended May 20. The number of deaths reported for the 4 weeks was 3.2 percent more than the average for the same weeks in 1941–43. For each week of the 4-week period the number of deaths was higher than the preceding 3-year average. A comparison of geographic regions shows that the number of deaths was above the average in all regions except the New England and South Atlantic. The largest excess occurred in the West North Central region where there was an increase in the number of deaths during the current 4-week period over the preceding 3-year average of almost 20 percent.

PREVALENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED JUNE 3, 1944

Summary

The decline in the incidence of meningococcus meningitis continued. For the current week a total of 274 cases was reported, as compared with 332 for the preceding week, an average of 379 for the past 4 weeks, 437 for the corresponding week last year, and a 5-year (1939–43) median of 49. Five States, with reports of 19 to 37 cases each, reported an aggregate of 131 cases. The next largest numbers reported were 13 in Texas and 12 in Missouri. The total to date is still slightly larger than that for the same period last year, but the total since March 4 is 5,810, as compared with 6,962 for the corresponding period last year.

A total of 83 cases of typhoid fever was reported for the week, as compared with 114 for the preceding week and 123 for the 5-year median. The largest numbers reported were 9 cases in California, 8 in Texas, 7 in Louisiana, and 6 each in Massachusetts and South Carolina. The total for the year to date is 1,688, as compared with 1,316 for the same period last year and a 5-year median of 1,823.

For the country as a whole, a slight increase in the incidence of poliomyelitis was noted. A total of 46 cases was reported, as compared with 39 last week, 47 for the 5-year median, and 52 for the corresponding week last year. Only 3 States reported more than 3 cases—New York 9 and Louisiana and California 5 each. The cumulative figure is 547, as compared with 599 for the same period last year and a 5-year median of 503. The initial sharp rise last year occurred during the week ended June 5.

Further declines were recorded in the incidence of measles and scarlet fever. Totals of 16,130 for measles and 3,870 for scarlet fever were reported, as compared with 5-year medians of 16,646 and 2,559 respectively.

Only 7 cases of smallpox were reported, distributed in 6 States, as compared with a 5-year median of 42. The cumulative total to date is 248, as compared with 544 for the same period last year.

Deaths during the week in 93 large cities of the United States aggregated 8,436, as compared with 8,638 last week and a 3-year (1941–43) average of 8,496. The total to date is 213,762, as compared with 217,680 for the same period last year.

Telegraphic morbidity reports from State health officers for the week ended June 3, 1944, and comparison with corresponding week of 1943 and 5-year median

In these tables a zero indicates a definite report, while leaders imply that, although none was reported, cases may have occurred.

Division and State	Diphtheria			Influenza			Measles			Meningitis, meningococcus		
	Week ended—		Median, 1939–43	Week ended—		Median, 1939–43	Week ended—		Median, 1939–43	Week ended—		Median, 1939–43
	June 3, 1944	June 5, 1943		June 3, 1944	June 5, 1943		June 3, 1944	June 5, 1943		June 3, 1944	June 5, 1943	
NEW ENGLAND												
Maine	0	2	0	1	1	------	331	95	95	2	5	0
New Hampshire	0	0	0	------	0	------	61	50	23	2	5	0
Vermont	0	0	0	------	0	------	88	178	130	------	0	0
Massachusetts	7	0	3	------	0	------	810	1,168	1,037	7	17	2
Rhode Island	0	0	0	13	0	------	39	96	136	------	3	0
Connecticut	1	1	0	------	2	1	345	271	397	3	7	0
MIDDLE ATLANTIC												
New York	9	14	14	[1] 2	[1] 4	[1] 6	922	3,205	2,150	37	76	7
New Jersey	1	3	4	------	5	2	724	2,041	990	6	27	2
Pennsylvania	10	7	14	------	1	------	440	949	949	24	32	17
EAST NORTH CENTRAL												
Ohio	3	7	7	6	16	13	285	644	320	[2] 25	11	1
Indiana	6	7	5	1	3	4	162	420	111	9	9	0
Illinois	5	30	23	2	12	9	396	1,707	241	19	26	1
Michigan [3]	6	6	3	1	1	1	503	2,279	610	9	9	1
Wisconsin	2	1	1	2	24	22	1,582	2,457	1,284	2	2	0
WEST NORTH CENTRAL												
Minnesota	1	2	2	------	0	1	275	466	216	4	0	0
Iowa	3	4	3	------	0	------	115	109	145	------	2	1
Missouri	3	2	2	------	0	------	124	234	172	12	23	0
North Dakota	0	1	1	------	3	1	34	11	14	------	0	0
South Dakota	1	0	0	------	0	------	13	602	27	------	3	0
Nebraska	5	2	2	2	2	2	149	190	160	3	1	0
Kansas	0	4	1	5	0	2	219	402	358	4	3	0
SOUTH ATLANTIC												
Delaware	0	1	0	------	0	------	4	47	36	2	1	0
Maryland [3]	6	2	2	------	2	2	193	186	186	5	14	1
Dist. of Columbia	0	0	1	------	0	------	88	104	104	------	5	1
Virginia	1	5	7	45	94	87	364	538	538	9	15	1
West Virginia	1	4	3	------	2	4	248	32	32	5	4	1
North Carolina	9	7	8	3	0	------	569	235	439	2	15	0
South Carolina	4	0	3	157	145	154	205	103	103	1	3	1
Georgia	2	2	2	7	2	12	96	58	103	------	8	1
Florida	3	2	3	------	36	14	124	127	116	2	20	0
EAST SOUTH CENTRAL												
Kentucky	0	2	2	------	11	2	88	111	79	5	6	1
Tennessee	2	2	3	15	4	10	102	120	151	9	7	1
Alabama	1	3	3	33	33	31	148	116	116	8	1	3
Mississippi [3]	3	5	3	------	0	------	0	------	------	1	1	1
WEST SOUTH CENTRAL												
Arkansas	2	2	2	64	2	7	92	43	77	1	2	1
Louisiana	3	2	2	1	6	4	31	35	35	3	7	1
Oklahoma	1	2	2	26	28	22	156	25	57	1	2	0
Texas	25	13	15	242	403	239	1,820	345	423	13	3	1
MOUNTAIN												
Montana	0	0	0	12	4	4	74	70	70	------	0	0
Idaho	0	0	0	------	0	------	21	29	37	------	2	0
Wyoming	0	0	1	------	15	------	77	94	26	1	0	0
Colorado	6	8	6	46	65	17	148	503	336	2	1	0
New Mexico	1	1	1	3	0	------	44	17	45	------	0	0
Arizona	0	3	1	25	44	40	48	34	35	------	3	0
Utah [3]	0	1	0	4	2	1	67	94	94	3	14	0
Nevada	4	0	0	------	0	------	27	20	0	------	1	0
PACIFIC												
Washington	4	1	1	3	1	------	250	115	320	4	2	0
Oregon	0	2	1	7	15	7	104	155	102	2	8	0
California	17	11	13	22	38	34	3,325	741	741	27	31	2
Total	158	174	175	750	1,026	804	16,180	21,671	16,646	274	437	49
22 weeks	4,921	5,471	5,824	338,291	74,749	147,113	537,629	444,654	408,494	10,883	10,720	1,063

See footnotes at end of table.

Telegraphic morbidity reports from State health officers for the week ended June 3 1944, and comparison with corresponding week of 1943 and 5-year median—Con.

Division and State	Poliomyelitis			Scarlet fever			Smallpox			Typhoid and paratyphoid fever [4]		
	Week ended—		Median 1939–43	Week ended—		Median 1939–43	Week ended—		Median 1939–43	Week ended—		Median 1939–43
	June 3, 1944	June 5, 1943		June 3, 1944	June 5, 1943		June 3, 1944	June 5, 1943		June 3, 1944	June 5, 1943	
NEW ENGLAND												
Maine	0	0	0	49	24	4	0	0	0	0	0	0
New Hampshire	0	0	0	4	8	5	0	0	0	0	1	0
Vermont	1	1	0	7	14	12	0	0	0	0	0	0
Massachusetts	2	0	0	221	381	138	0	0	0	6	0	2
Rhode Island	0	0	0	8	17	8	0	0	0	0	2	0
Connecticut	1	0	0	56	78	39	0	0	0	1	0	0
MIDDLE ATLANTIC												
New York	9	0	0	389	477	389	0	0	0	3	9	6
New Jersey	1	0	0	145	68	119	0	0	0	0	1	1
Pennsylvania	1	0	0	285	189	234	0	0	0	0	3	7
EAST NORTH CENTRAL												
Ohio	2	0	0	426	191	232	0	1	1	0	0	2
Indiana	0	0	0	85	53	78	0	2	1	2	0	1
Illinois	2	0	0	221	116	179	1	1	8	2	0	2
Michigan [2]	1	0	0	222	99	182	0	0	0	2	0	0
Wisconsin	0	0	0	253	292	109	0	0	2	0	0	1
WEST NORTH CENTRAL												
Minnesota	1	0	0	118	51	51	0	0	0	2	0	0
Iowa	0	0	0	51	34	26	0	0	3	2	1	1
Missouri	0	0	0	47	81	43	1	0	1	3	6	6
North Dakota	0	0	0	5	1	2	0	0	0	0	0	2
South Dakota	0	0	0	18	12	12	0	0	1	0	0	0
Nebraska	0	1	0	54	22	13	1	1	1	1	0	0
Kansas	0	1	0	43	29	38	1	0	0	0	0	0
SOUTH ATLANTIC												
Delaware	0	0	0	4	2	5	0	0	0	0	0	0
Maryland [2]	1	0	0	94	73	46	0	0	0	2	0	2
District of Columbia	0	0	0	35	8	8	0	0	0	0	4	1
Virginia	0	0	0	36	20	19	0	0	0	1	5	5
West Virginia	0	1	0	50	17	20	0	0	0	0	1	3
North Carolina	0	2	0	25	16	16	0	0	0	2	4	4
South Carolina	1	0	0	7	6	4	0	0	0	6	1	3
Georgia	1	0	0	33	10	10	0	0	0	5	9	11
Florida	3	3	1	5	4	4	0	0	0	3	5	3
EAST SOUTH CENTRAL												
Kentucky	2	0	0	27	29	29	2	0	1	0	1	5
Tennessee	0	0	0	59	10	38	0	0	3	1	2	4
Alabama	2	0	0	5	7	10	0	0	0	0	2	2
Mississippi [2]	1	0	0	3	1	1	0	0	0	3	1	1
WEST SOUTH CENTRAL												
Arkansas	0	2	0	4	8	4	0	0	5	2	4	4
Louisiana	5	0	0	0	7	5	0	0	0	7	3	10
Oklahoma	0	0	0	6	16	10	0	0	1	2	0	1
Texas	3	6	3	146	20	20	0	0	0	8	10	11
MOUNTAIN												
Montana	0	0	0	14	9	9	0	0	0	1	1	0
Idaho	0	0	0	33	74	4	0	1	0	0	0	0
Wyoming	0	0	0	16	15	4	0	0	0	0	0	0
Colorado	0	0	0	56	69	29	0	0	1	1	2	2
New Mexico	0	0	0	6	0	2	0	0	0	0	0	0
Arizona	0	1	0	9	5	4	0	0	0	0	0	0
Utah [2]	0	1	0	34	13	9	0	0	0	0	0	0
Nevada	0	0	0	13	0	0	0	0	0	4	0	0
PACIFIC												
Washington	0	0	0	120	16	22	1	1	0	1	0	2
Oregon	1	0	1	71	14	8	0	1	1	1	0	0
California	5	33	9	252	138	105	0	0	1	9	2	5
Total	46	52	47	3,870	2,844	2,559	7	8	42	83	80	123
22 weeks	547	599	503	132,109	85,342	85,342	248	544	995	1,688	1,316	1,823

See footnotes at end of table.

Telegraphic morbidity reports from State health officers for the week ended June 3, 1944, and comparison with corresponding week of 1943 and 5-year median—Con.

Division and State	Whooping cough: Week ended— June 3, 1944	Whooping cough: Week ended— June 5, 1943	Whooping cough: Median 1939–43	Week ended June 3, 1944: Anthrax	Dysentery: Amebic	Dysentery: Bacillary	Dysentery: Unspecified	Encephalitis, infectious	Leprosy	Rocky Mt. spotted fever	Tularemia	Typhus fever
NEW ENGLAND												
Maine	17	19	25	0	0	0	0	0	0	0	0	0
New Hampshire	1	4	4	0	0	0	0	1	0	0	0	0
Vermont	19	15	15	0	0	0	0	0	0	0	0	0
Massachusetts	39	97	130	0	1	3	0	1	0	0	0	0
Rhode Island	6	19	19	0	0	0	0	0	0	0	0	0
Connecticut	21	31	45	0	0	1	0	0	0	0	0	0
MIDDLE ATLANTIC												
New York	93	227	334	0	0	7	0	3	0	1	0	0
New Jersey	30	126	126	0	0	0	0	0	0	2	0	0
Pennsylvania	56	246	238	0	1	0	0	0	0	3	0	0
EAST NORTH CENTRAL												
Ohio	110	146	169	0	3	0	0	1	0	0	0	0
Indiana	30	60	54	0	0	0	0	0	0	0	0	0
Illinois	34	145	145	0	1	2	0	1	0	0	0	0
Michigan [2]	77	164	164	0	1	2	0	0	0	0	0	0
Wisconsin	81	199	140	0	0	0	0	1	0	0	0	0
WEST NORTH CENTRAL												
Minnesota	13	86	43	0	2	0	0	0	0	0	0	0
Iowa	10	38	26	0	0	0	0	0	0	0	0	0
Missouri	26	41	28	0	0	0	2	1	0	0	0	0
North Dakota	5	2	5	0	0	0	0	0	0	0	0	0
South Dakota	8	4	3	0	0	0	0	0	0	1	0	0
Nebraska	17	14	13	0	0	0	0	0	0	0	0	0
Kansas	46	76	63	0	1	0	0	0	0	0	0	0
SOUTH ATLANTIC												
Delaware	0	10	6	0	0	0	0	0	0	1	0	0
Maryland [3]	32	94	81	0	0	0	1	2	0	4	0	0
District of Columbia	1	30	21	0	0	0	0	0	0	0	0	0
Virginia	64	204	68	0	0	0	44	0	0	4	0	0
West Virginia	29	41	57	0	0	0	0	0	0	2	0	0
North Carolina	116	207	197	0	0	0	0	0	0	2	0	0
South Carolina	76	66	69	0	3	40	0	0	0	0	0	0
Georgia	20	47	47	0	1	7	0	0	0	0	2	12
Florida	21	26	26	0	0	51	0	2	0	0	0	3
EAST SOUTH CENTRAL												
Kentucky	56	29	65	0	1	0	0	1	0	0	0	0
Tennessee	61	42	48	0	1	0	4	0	0	1	2	0
Alabama	37	44	53	0	1	0	0	0	0	0	0	4
Mississippi [3]	0	-----	-----	0	0	0	0	0	0	0	4	8
WEST SOUTH CENTRAL												
Arkansas	13	52	20	0	0	21	0	0	0	0	7	0
Louisiana	2	2		0	1	2	0	0	0	1	0	6
Oklahoma	15	43	10	0	0	0	0	0	0	0	0	0
Texas	297	592	294	0	4	414	0	0	0	0	0	23
MOUNTAIN												
Montana	2	12	12	0	0	0	0	0	0	0	0	0
Idaho	11	8	8	0	0	0	0	0	0	0	0	0
Wyoming	10	3	3	0	0	0	0	0	0	1	1	0
Colorado	256	24	28	0	2	1	0	0	0	2	0	0
New Mexico	-----	5	13	0	0	1	1	0	0	0	0	0
Arizona	22	23	18	0	2	0	41	0	0	0	0	0
Utah [3]	51	47	47	0	0	0	0	0	0	0	1	0
Nevada	20	0	0	0	0	0	1	0	0	0	0	0
PACIFIC												
Washington	16	23	41	0	0		0	0	0	0	0	0
Oregon	4	23	22	0	0	0	0	0	0	0	0	0
California	99	365	365	0	2	4	0	2	0	0	0	1
Total	2,070	3,821	3,765	0	28	556	94	16	0	25	17	57
22 weeks	89,767	89,019	87,076	17	562	6,002	1,643	241	13	72	238	998
22 weeks, 1943	-----	-----	-----	30	677	4,612	1,139	244	11	86	387	1,017

[1] New York City only.
[2] A later report from Ohio for the week ended Apr. 1, 1944, showed 30 cases of meningococcus meningitis nstead of 56 as originally published.
[3] Period ended earlier than Saturday.
[4] Later information from South Carolina states that 3 cases reported as smallpox for the week ended May 20, 1944, were not smallpox.
[5] Including paratyphoid fever cases reported separately, as follows: Massachusetts 3, Connecticut 1, Florida 1, Louisiana 2, Texas 2.

WEEKLY REPORTS FROM CITIES

City reports for week ended May 20, 1944

This table lists the reports from 85 cities of more than 10,000 population distributed throughout the United States, and represents a cross section of the current urban incidence of the diseases included in the table.

	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
NEW ENGLAND												
Maine:												
Portland	0	0	------	0	50	0	3	0	18	0	0	0
New Hampshire:												
Concord	0	0	------	0	0	0	0	0	0	0	0	0
Massachusetts:												
Boston	0	0	------	0	148	11	13	0	86	0	0	7
Fall River	0	0	------	0	20	0	0	0	1	0	0	1
Springfield	0	0	------	0	38	0	0	0	25	0	1	8
Worcester	0	0	------	0	5	0	9	0	21	0	0	5
Rhode Island:												
Providence	1	0	------	0	25	0	4	0	6	0	0	15
Connecticut:												
Bridgeport	0	0	------	0	6	0	0	0	2	0	0	0
Hartford	0	0	------	0	9	1	0	0	24	0	0	0
New Haven	0	0	2	0	40	1	1	0	0	0	0	0
MIDDLE ATLANTIC												
New York:												
Buffalo	0	0	------	0	11	0	4	0	11	0	1	1
New York	13	0	3	1	624	30	43	1	252	0	0	31
Rochester	0	0	------	0	40	0	5	0	9	0	1	3
Syracuse	0	0	------	0	8	0	1	0	3	0	0	2
New Jersey:												
Camden	0	0	------	0	1	1	0	0	19	0	0	0
Newark	0	0	------	0	200	1	4	0	40	0	0	3
Trenton	0	0	------	0	2	0	0	0	3	0	1	7
Pennsylvania:												
Philadelphia	3	0	3	2	52	10	24	0	89	0	1	6
Pittsburgh	1	0	3	3	16	10	16	0	17	0	0	2
Reading	0	0	0	1	1	0	3	0	2	0	0	0
EAST NORTH CENTRAL												
Ohio:												
Cincinnati	4	0	------	0	24	6	3	1	32	0	0	5
Cleveland	0	0	------	0	26	6	17	0	120	0	2	8
Columbus	0	0	------	0	24	0	2	0	0	0	0	0
Indiana:												
Fort Wayne	0	0	------	0	0	0	3	0	1	0	0	0
Indianapolis	2	0	------	2	54	0	4	0	26	0	0	11
South Bend	0	0	------	0	1	0	0	0	3	0	0	1
Terre Haute	0	0	------	0	1	0	1	0	2	0	0	0
Illinois:												
Chicago	4	0	3	2	143	21	24	0	165	0	0	17
Springfield	0	0	------	0	32	0	0	0	5	0	1	0
Michigan:												
Detroit	8	1	------	0	126	14	13	0	126	0	0	28
Flint	0	0	------	0	4	1	1	0	3	0	0	2
Grand Rapids	0	0	------	0	16	1	1	0	6	0	0	0
Wisconsin:												
Kenosha	0	0	------	0	258	0	0	0	0	0	0	1
Milwaukee	0	0	------	0	265	3	2	0	52	0	0	14
Racine	0	0	------	0	140	0	0	0	3	0	0	5
Superior	1	0	------	0	5	0	0	0	21	0	0	0
WEST NORTH CENTRAL												
Minnesota:												
Minneapolis	0	0	------	0	134	1	5	0	30	0	0	0
St. Paul	0	0	------	1	71	4	6	0	22	0	0	2
Missouri:												
Kansas City	0	0	------	1	86	1	5	0	28	0	0	1
St. Joseph	0	0	------	0	2	1	0	0	4	0	0	0
St. Louis	0	1	1	0	33	13	7	0	33	0	0	1
Nebraska:												
Omaha	0	0	------	0	101	2	7	0	20	0	0	0
Kansas:												
Topeka	1	0	------	1	38	0	1	0	3	0	0	7
Wichita	0	0	------	0	17	0	5	0	4	0	0	2

City reports for week ended May 20, 1944—Continued

	Diphtheria cases	Encephalitis, infectious, cases	Influenza Cases	Influenza Deaths	Measles cases	Meningitis, meningococcus cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
SOUTH ATLANTIC												
Maryland:												
Baltimore	13	0	------	0	258	4	9	0	78	0	0	37
Cumberland	0	0	------	0	1	0	1	0	1	0	0	0
Frederick	0	0	------	0	0	0	0	0	1	0	0	0
District of Columbia:												
Washington	0	0	4	1	178	3	6	0	96	0	1	8
Virginia:												
Lynchburg	0	0	------	0	2	0	0	0	3	0	0	0
Richmond	0	0	------	0	21	0	2	0	5	0	1	2
Roanoke	0	0	------	0	4	0	0	0	2	0	0	4
West Virginia:												
Charleston	0	0	------	0	0	0	0	0	8	0	0	0
Wheeling	0	0	------	0	38	1	1	0	12	0	0	1
North Carolina:												
Raleigh	0	0	------	0	37	0	0	0	1	0	0	2
Wilmington	0	0	------	0	13	0	2	0	0	0	0	5
Winston-Salem	0	0	------	0	15	0	0	0	2	0	0	2
South Carolina:												
Charleston	0	0	3	0	0	2	4	0	2	0	0	0
Georgia:												
Atlanta	0	0	3	0	14	0	2	0	12	0	0	1
Brunswick	0	0	------	0	0	0	0	0	0	0	0	0
Savannah	0	0	------	0	0	2	0	0	1	0	0	1
Florida:												
Tampa	1	0	------	0	4	0	2	0	0	0	1	0
EAST SOUTH CENTRAL												
Tennessee:												
Memphis	0	0	1	0	29	1	4	0	25	0	0	14
Nashville	0	0	------	0	14	0	2	0	3	0	0	0
Alabama:												
Birmingham	0	0	4	1	3	2	3	0	2	0	0	0
Mobile	0	0	1	0	0	0	0	1	1	0	1	0
WEST SOUTH CENTRAL												
Arkansas:												
Little Rock	0	0	1	0	13	0	1	0	0	0	0	1
Louisiana:												
New Orleans	3	0	1	2	10	7	10	6	1	0	0	3
Shreveport	0	0	------	0	5	0	0	0	0	0	1	1
Texas:												
Dallas	1	0	------	0	99	0	4	0	2	0	0	7
Galveston	0	0	------	0	3	0	0	0	2	0	0	0
Houston	2	0	------	0	12	4	2	0	3	0	1	0
San Antonio	0	0	2	0	5	2	5	2	0	0	0	1
MOUNTAIN												
Montana:												
Great Falls	0	0	------	0	7	0	0	0	2	0	0	0
Helena	0	0	------	0	1	0	0	0	0	0	0	0
Missoula	0	0	------	0	13	0	0	0	5	0	0	0
Idaho:												
Boise	0	0	------	0	0	0	0	0	2	0	0	0
Colorado:												
Denver	4	0	4	0	79	0	3	0	15	0	0	5
Pueblo	0	0	------	0	8	0	0	0	2	0	0	1
Utah:												
Salt Lake City	0	0	------	0	22	0	3	0	28	0	0	5
PACIFIC												
Washington:												
Seattle	0	0	------	1	51	1	1	0	41	0	1	2
Spokane	0	0	------	0	21	1	3	0	11	0	0	1
Tacoma	1	0	------	0	31	0	0	0	17	0	0	0
California:												
Los Angeles	5	0	14	0	487	6	6	2	25	0	0	4
Sacramento	0	0	1	0	76	1	0	0	9	0	0	8
San Francisco	1	0	------	0	291	0	8	0	40	0	0	6
Total	69	2	54	19	4,762	176	321	13	1,802	0	15	318
Corresponding week, 1943	76	------	58	16	9,026	------	363	------	1,397	0	19	1,177
Average, 1939-43	68	------	68	19	5,551	------	326	------	1,388	5	19	1,196

Dysentery, amebic.—Cases: New York, 1; Chicago, 1; St. Louis, 1; San Antonio, 1.
Dysentery, bacillary.—Cases: Providence, 3; Detroit, 3; Charleston, 6; Denver, 1; Los Angeles, 10.
Dysentery, unspecified.—Cases: Baltimore, 1; San Antonio, 7.
Rocky Mountain spotted fever.—Cases: Richmond, Va., 1.
Typhus fever.—Cases: New York, 3; Tampa, 1; New Orleans, 2; Houston, 4; San Antonio, 2.

Rates (annual basis) per 100,000 population, by geographic groups, for the 85 cities in the preceding table (estimated population, 1943, 34,254,800)

	Diphtheria case rates	Encephalitis, infectious, case rates	Influenza		Measles case rates	Meningitis, meningococcus, case rates	Pneumonia death rates	Poliomyelitis case rates	Scarlet fever case rates	Smallpox case rates	Typhoid and paratyphoid fever case rates	Whooping cough case rates
			Case rates	Death rates								
New England	2.6	0.0	5.2	0.0	891	34.0	78.4	0.0	478	0.0	2.6	94
Middle Atlantic	7.7	0.0	4.1	3.2	434	23.6	45.4	0.5	202	0.0	1.8	25
East North Central	11.6	0.6	1.8	2.4	683	31.7	43.3	0.6	345	0.0	1.8	56
West North Central	2.1	2.1	2.1	6.2	996	45.4	74.4	0.0	308	0.0	0.0	27
South Atlantic	23.7	0.0	16.9	1.7	990	20.3	49.1	0.0	379	0.0	5.1	107
East South Central	0.0	0.0	34.9	5.8	268	17.5	52.4	5.8	181	0.0	5.8	82
West South Central	17.0	0.0	11.4	5.7	417	36.9	62.5	22.7	227	0.0	5.7	37
Mountain	32.7	0.0	32.7	0.0	1,064	0.0	49.1	0.0	442	0.0	0.0	90
Pacific	11.5	0.0	24.7	1.6	1,578	14.8	29.7	3.3	236	0.0	1.6	35
Total	10.5	0.3	8.2	2.9	727	26.9	49.0	2.0	275	0.0	2.3	49

PLAGUE INFECTION IN QUAY COUNTY, N. MEX.

Plague infection has been reported proved in a pool of 13 fleas from 2 cotton rats, *Sigmodon hispidus*, collected on May 10, 1944, on U. S. Highway No. 66, 20 miles east of Tucumcari, in Quay County, N. Mex.

TERRITORIES AND POSSESSIONS

Hawaii Territory

Honolulu—Dengue fever.—For the period May 1–15, 1944, 12 cases of dengue fever were reported in Honolulu, T. H., bringing the total number of cases reported since the beginning of the outbreak during the summer of 1943 to 1,490. The current figure represents an increase of 7 cases over the previous semimonthly period.

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—Week ended May 6, 1944.—During the week ended May 6, 1944, cases of certain communicable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox	--------	14	3	154	309	23	41	58	170	772
Diphtheria	--------	8	2	13	--------	2	1	1	--------	27
Dysentery (bacillary)	--------	--------	--------	3	--------	--------	--------	--------	--------	3
German measles	--------	11	--------	163	73	4	24	12	64	351
Influenza	--------	--------	--------	--------	33	1	3	--------	10	47
Measles	--------	19	17	924	734	330	113	139	35	2,311
Meningitis, meningococcus	--------	2	--------	1	6	1	--------	--------	2	12
Mumps	--------	15	12	184	168	45	9	61	86	580
Scarlet fever	--------	27	4	78	187	68	24	79	87	554
Tuberculosis (all forms)	--------	5	8	132	98	14	12	23	60	352
Typhoid and paratyphoid fever	--------	--------	--------	5	1	--------	--------	8	--------	14
Undulant fever	--------	--------	--------	--------	1	--------	--------	1	--------	2
Whooping cough	--------	44	--------	62	28	2	14	12	46	208

IRAN

Typhus fever—March 22, 1943—April 2, 1944.—According to a report of the Iranian Ministry of Health, 15,435 new cases of typhus fever were reported in Iran from March 22, 1943, to April 2, 1944. The cases were distributed as follows: *1943*—Week ended March 28, 300 cases; April–June, 10,322; July–September, 1,191; October–December, 437; *1944*—January, 586 cases; February, 937; March, 1,662.

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

NOTE.—Except in cases of unusual incidence, only those places are included which had not previously reported any of the above-mentioned diseases, except yellow fever, during the current year. All reports of yellow fever are published currently.

A table showing the accumulated figures for these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.

(Few reports are available from the invaded countries of Europe and other nations in war zones.)

Cholera

India—Calcutta.—Deaths from cholera have been reported in Calcutta, India, as follows: Weeks ended—April 8, 1944, 34; April 22, 1944, 58; April 29, 1944, 95; May 6, 1944, 98.

Plague

Madagascar.—During the period January 20–March 10, 1944, 50 cases of plague, with 41 deaths, were reported in Madagascar.

Smallpox

Bolivia.—For the month of April 1944, a total of 77 cases of smallpox, with 12 deaths, was reported for the Republic of Bolivia.

Typhus Fever

Bolivia.—A total of 18 cases of typhus fever, with 10 deaths, was reported in Bolivia for the month of April 1944.

Chile.—For the period February 27–March 25, 1944, 29 cases of typhus fever, with 5 deaths, were reported in Chile.

DEATHS DURING WEEK ENDED MAY 27, 1944

[From the Weekly Mortality Index, issued by the Bureau of the Census, Department of Commerce]

	Week ended May 27, 1944	Corresponding week 1943
Data for 92 large cities of the United States:		
Total deaths	8,016	8,384
Average for 3 prior years	7,653	
Total deaths, first 21 weeks of year	189,557	192,589
Deaths under 1 year of age	581	597
Average for 3 prior years	514	
Deaths under 1 year of age, first 21 weeks of year	12,422	13,648
Data from industrial insurance companies:		
Policies in force	66,566,613	65,536,014
Number of death claims	13,600	12,470
Death claims per 1,000 policies in force, annual rate	10 7	9.9
Death claims per 1,000 policies, first 21 weeks of year, annual rate	10.9	10.5

×

FEDERAL SECURITY AGENCY

UNITED STATES PUBLIC HEALTH SERVICE

THOMAS PARRAN, *Surgeon General*

DIVISION OF PUBLIC HEALTH METHODS

G. St. J. PERROTT, *Chief of Division*

The PUBLIC HEALTH REPORTS, first published in 1878 under authority of an act of Congress of April 29 of that year, is issued weekly by the United States Public Health Service through the Division of Public Health Methods, pursuant to the following authority of law: United States Code, title 42, sections 7, 30, 93; title 44, section 220.

It contains (1) current information regarding the prevalence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

The PUBLIC HEALTH REPORTS is published primarily for distribution, in accordance with the law, to health officers, members of boards or departments of health, and other persons directly or indirectly engaged in public health work. Articles of special interest are issued as reprints or as supplements, in which forms they are made available for more economical and general distribution.

Requests for and communications regarding the PUBLIC HEALTH REPORTS, reprints, or supplements should be addressed to the Surgeon General, United States Public Health Service, Washington 14, D. C. Subscribers should remit direct to the Superintendent of Documents, Washington, D. C.

Librarians and others should preserve their copies for binding, as the Public Health Service is unable to supply the general demand for bound copies. Indexes will be supplied upon request.

UNITED STATES GOVERNMENT PRINTING OFFICE, WASHINGTON : 1944

For sale by the Superintendent of Documents, Washington, 25 D. C.

Price 5 cents. Subscription price $2.50 a year

Public Health Reports

VOLUME 59 JUNE 16, 1944 NUMBER 24

IN THIS ISSUE

Phenyl Arsenoxides in Experimental Trypanosomiasis

U.S. PUBLIC HEALTH SERVICE
1798

CONTENTS

Public Health Reports

Vol. 59 • JUNE 16, 1944 • *No. 24*

THE THERAPEUTIC EFFICACY OF PHENYL ARSENOXIDES IN MOUSE AND RABBIT TRYPANOSOMIASIS (*TRYP. EQUIPERDUM*)[1]

By HARRY EAGLE, *Surgeon*, RALPH B. HOGAN, *Surgeon*, GEORGE O. DOAK, *Chemist*, and HARRY G. STEINMAN, *Associate Chemist, United States Public Health Service*[2]

A series of mono- and di-substituted phenyl arsenoxides, embracing a wide variety of substituent groups, has been prepared in this laboratory (*1*). Previous communications have dealt with their spirocheticidal activity in relation to their possible usefulness in the treatment of syphilis (*2*). The present paper describes their trypanocidal activity (*Tryp. equiperdum*) in vitro and in vivo, the latter in comparison with representative arsonic acids.

I. Methods and Materials

A. TRYPANOCIDAL ACTION IN VITRO

Rats and white mice were inoculated intraperitoneally by the injection of 1 cc. and 0.1 cc., respectively, of a trypanosome suspension containing 10^7 organisms per cc. The animals were bled from the heart into 5 percent potassium oxalate 48 to 72 hours after inoculation, at the height of the blood infestation. The oxalated blood was rapidly chilled to 0° C. by placing in a freezing cabinet at −25° C. for 5 to 10 minutes, and a rabbit antiserum to rat and mouse red blood cells was then added (0.05 cc. per cc. blood). After thorough admixture, the blood was replaced in the freezing cabinet for a few minutes to allow agglutination of the red blood cells and was then centrifuged, slowly at first to permit the sedimentation of the agglutinated clumps of red blood cells, and then at gradually increasing speed. The red blood cells formed a coherent clump at the bottom of the tube, with a clearly demarcated supernatant white layer of trypanosomes, varying in thickness according to the trypanosome content of the blood. With due care to keep the mixture cold, the rat or mouse antiserum did not cause hemolysis despite the massive

[1] From the Venereal Disease Research and Postgraduate Training Center, U. S. Public Health Service, Johns Hopkins Hospital, Baltimore, Md. Received for publication February 14, 1944

[2] With the technical assistance of Arlyne D. Musselman, Ralph Fleischman, and Leon Freedman.

agglutination of the red blood cells. The oxalated plasma was removed with a capillary pipette and discarded. The layer of trypanosomes was then gently broken up and resuspended in a serum-buffer mixture, care being taken not to disturb the underlying layer of agglutinated red blood cells. The serum-buffer mixture consisted of 1 part of fresh rabbit serum, 2 parts of an isotonic phosphate buffer at pH 7.4, 2 parts of 0.85 percent NaCl, and 1/50 part of 5 percent glucose. In this medium more than 95 percent of the trypanosomes remained fully active for at least 6 hours at room temperature. The final suspension of trypanosomes contained approximately 20 million organisms per cc. and was filtered through No. 12 Whatman filter paper to remove clumps of organisms or minute clumps of red blood cells inadvertently included.

The method used for the assay of trypanocidal action in vitro resembled that used by Yorke and Murgatroyd (*3*), except that the proportion of motile organisms was used as the end point rather than their absolute number, and the incubation time was 2 to 4 hours instead of 24. In each series of assays, the amount of arsenical which immobilized half of the organisms was determined, as compared with a standard reference compound tested at the same time and with the same trypanosomal suspension. Unsubstituted phenyl arsenoxide was used throughout as the reference compound. Minor variations in trypanosome count, in temperature, or in the incubation time did not affect the assay, since the reference compound was tested under the same conditions. A similar technique has been described by one of us for the determination of spirocheticidal activity in vitro (*4*).

TABLE 1.—*Illustrating the method used for the determination of relative trypanocidal action in vitro*

Compound (RC_6H_4AsO or $R_1R_2C_6H_3AsO$)	Dilution used [1]	Cc. of arsenical solution in a total volume of 0.4 cc. (0.4 cc. of trypanosomal suspension then added)							Amount of solution at which 45 percent of organisms remained motile [2]	Relative trypanocidal activity per gram referred to that of phenyl arsenoxide as 100 [3]
		0.4	0.28	0.2	0.14	0.1	0.07	0.05		
		Proportion of motile organisms after 135 minutes at room temperature (23° C.)								
Unsubstituted phenyl arsenoxide (reference compound)	1:4,000,000	-	0	30	>90	-	--	--	0.185	100
p-$(CH_2)_3COOH$	1:1,000,000	0	0	0	36	84	--	-	.13	35
3-NH_2-4-COOH	1:100,000	-	-	0	30	90	-	--	.13	35
p-NH_2	1:2,000,000	-	0	85	-		--	--	.24	38
p-$CONHC_2H_4OH$	1:500,000	--	--	--	0	64	--		.11	20
Unsubstituted phenyl arsenoxide	1:4,000,000	0	0	20	>90	--	--	--	.18	100

[1] Determined by preliminary orienting experiment.

[2] By interpolation.

[3] $\frac{\text{Amount of reference solution}}{\text{Amount of unknown solution}} \times \frac{\text{Concentration of reference solution}}{\text{Concentration of unknown solution}} \times 100$. Thus, for the first compound listed in the table (the p-$(CH_2)_3COOH$ phenyl arsenoxide) the activity relative to that of phenyl arsenoxide was:

$$\frac{0.182}{0.132} \times \frac{1:4,000,000}{1:1,000,000} \times 100 = 1.39 \times \frac{1}{4} \times 100 = 35.$$

As illustrated in table 1, varying amounts of the arsenical to be tested were distributed in a series of tubes, the volume brought to 0.4 cc. with 0.85 percent NaCl, and an equal volume of the trypanosome suspension added. Similar rows were prepared for each of four to six compounds simultaneously tested, allowing a 5-minute interval between the addition of the organisms to succeeding rows. After 120 to 240 minutes at room temperature, the proportion of motile organisms was determined by direct dark-field observation. With practice it was possible to complete a single assay in 5 minutes, so that in each row the trypanosomes would have remained in contact with the arsenical for the same period of time. As indicated in table 1, the volume of arsenical solution necessary to reduce the proportion of motile organisms to just 45 percent was determined by interpolation: and this value, considered in relation to the corresponding amount of the reference compound and the dilutions employed, gave directly the relative trypanocidal action in vitro (last column of table 1).

B. TRYPANOCIDAL ACTION IN VIVO

(*a*) Male white mice weighing 16 to 20 gm. were inoculated by the intraperitoneal injection of 100,000 organisms (0.1 cc. of a suspension containing 10^6 per cc.). Twenty-four hours later the mice were treated by the intraperitoneal injection of an arsenical solution in a volume of 0.25 to 0.8 cc. Survival for more than 30 days was taken as the criterion of cure. Untreated controls died regularly in 3 to 5 days. In inadequately treated animals, death was usually delayed, but only rarely beyond the twentieth day; and at such intermediate dosages, 20 mice which had survived beyond the thirtieth day were found to be noninfectious.

Between 6 and 15 mice were used in each series of doses; and the minimal curative dose ($CD_{>95}$) and the CD_{50} (the dose which cured 50 percent of the mice) were determined by the Reed-Muench method (*5*) as illustrated in table 2.

TABLE 2.—*Method used for evaluation of therapeutic activity of arsenicals in experimental trypanosomiasis (white mice)*

Mice weighing 16 to 20 gm. were inoculated intraperitoneally with 10^6 organisms (*Trypanosoma equiperdum*) and were treated by a single intraperitoneal injection of arsenical 24 hours later. Survival for more than 30 days was taken as the criterion of cure.

Compound used	Mg./kg.	Dead	Survived	Recalculated after Reed and Muench (*5*)			CD_{50}, mg./kg.	MCD (>95 percent cure), mg./kg.
				Dead	Survived	Cured (percent)		
p-$CONHC_2H_4OH$-C_6H_4AsO	8	0	12	0	28	100	4.1	8.0±
	6	5	6	5	16	74		
	4	6	6	11	10	48		
	3	7	3	18	4	18		
	2	7	1	25	1	4		
	1.5	3	0	28	0	0		

(*b*) Rabbits. The disease caused by *Tryp. equiperdum* in rabbits is not an acute blood infection as it is in rats and mice but is a more chronic disease involving the tissues and manifested particularly by conjunctivitis, blepharitis, rhinitis, and edema and inflammation of the ears, perineal area, and skin (*6*). The animals were inoculated by the intravenous injection of 1 cc. of a suspension containing 10^7 organisms per cc. Fourteen to 17 days later, when the disease had become manifest,[3] they were treated by intravenous injections of the arsenical, repeated once daily for a total of 4 days. Survival for a period of 90 to 140 days after inoculation, with no demonstrable residual involvement, was taken as the criterion of cure. More than 95 percent of the controls died within 12 to 55 days after inoculation, and only 2 of 62 untreated controls survived for more than 100 days Death was often delayed in inadequately treated animals, most of which died 3 to 55 days after treatment. The minimal curative dose and the CD_{50} were determined from the experimental data as illustrated in table 3.

TABLE 3.—*Method used for evaluation of therapeutic activity of arsenicals in experimental trypanosomiasis (rabbits)*

Rabbits were inoculated by the intravenous injection of 10^7 organisms Fourteen to 17 days later, after the animal was obviously infected, it was treated by intravenous injections of the arsenical, repeated daily for 4 successive days Survival for more than 90 to 140 days after inoculation, with no residual evidences of infection, was taken as the criterion of cure Controls died regularly within 55 days

Compound used	Mg./kg per injection	Dead	Survived	Recalculated after Reed and Muench (*5*)			CD_{50}, mg./kg total	MCD (>95 percent cure), mg./kg. total
				Dead	Survived	Survived (percent)		
p-$(CH_2)_2COOH$ C_6H_4AsO	2	2	5	2	19	90	0 94×4=3 8	2×4=8±
	1 5	2	5	4	14	78		
	1 0	3	4	7	9	57		
	75	4	3	11	5	31		
	5	5	2	16	2	11		

C. TOXICITY IN WHITE MICE AND RABBITS

The maximal tolerated dose ($LD_{<5}$), the LD_{50} and the minimal lethal dose ($LD_{>95}$) after a single intraperitoneal injection were determined in white mice as previously described (*4*). The same values were determined in rabbits for a single intravenous injection, and for intravenous injections repeated daily for 4 days.

II. Experimental Results

A. TRYPANOCIDAL ACTION IN VITRO

The relative trypanocidal activities in vitro of the phenyl arsenoxides studied in this respect are summarized in the second vertical

[3] Of 568 animals inoculated, 64 died before treatment Twelve of these were apparently adventitious deaths, occurring within 1 week, the remaining 52 were probably deaths due to the disease and are not included in the experimental protocols.

column of table 4. As in the case of spirochetes, the unsubstituted phenyl arsenoxide was one of the most active compounds in the series, and substitution in the phenyl ring usually served only to reduce that activity to varying degree. In general, the methyl, chloro, and nitro groups had little or no effect either on trypanocidal activity or toxicity; while amino- and hydroxyl-, acetamido-, amido-, and acid-substituted compounds had decreasing activity, in approximately that order. The one exception encountered to the marked inhibiting effect of acidic substitution on trypanocidal activity was provided by the p-$(CH_2)_3COOH$ compound, which was twelve times more active than any other acid-substituted compound tested (cf. p. 779).

In the evaluation of arsenicals with respect to antisyphilitic activity, the trypanocidal action in mice or rats has often been used as a screening procedure (cf. (*7*)), this despite the finding by several workers (*8*, *9*, *10*) that there is no regular or necessary correlation between trypanocidal and treponemicidal activity. With the present series of phenyl arsenoxides, there was in general a rough qualitative agreement between spirocheticidal and trypanocidal activity in vitro, as seen in table 4 and figure 1. However, with those substituents which had a marked effect in lowering activity, toxicity, or both, the results with the two types of assay often differed widely and were sometimes wholly discrepant. This is shown by the increasing scatter in the left-hand portion of figure 1 and is particularly evident from the last column of table 4, in which are listed the ratios of

$$\frac{\text{treponemicidal activity in vitro}}{\text{trypanocidal activity in vitro}}.$$

That ratio would be 1 were there perfect correlation between the two types of parasiticidal action; and the degree to which those ratios deviated from 1, and the irregularity of that deviation, are a measure of the quantitative unreliability of either assay as a measure of the other. Moreover, compounds are occasionally encountered which, like the p-$(CH_2)_3COOH$ phenyl arsenoxide (cf. point in lower right portion of fig. 1), are highly active against trypanosomes and yet have only a negligible treponemicidal action. There is no reason to doubt that the reverse may also occur.

An in vivo comparison of the treponemicidal and trypanocidal action of arsenicals would be further complicated by their varying absorption, excretion, and chemical modification in different animal species. Thus, as shown in table 5, in a small series of amide-substituted phenyl arsenoxides and their derivatives, there was a sevenfold variation in the ratio of $\frac{\text{treponemicidal action in rabbits}}{\text{trypanocidal action in mice}}$, this despite the chemical and pharmacologic similarity of the compounds tested. It seems clear

TABLE 4.—*The direct trypanocidal and treponemicidal activity in vitro of a series of phenyl arsenoxides*

[All values are molar, referred to that of phenyl arsenoxide as 100]

Compound tested (RC_6H_4AsO or $R_1R_2C_6H_3AsO$)		Parasiticidal action in vitro per mole referred to that of phenyl arsenoxide as 100: Trypanocidal	Parasiticidal action in vitro per mole referred to that of phenyl arsenoxide as 100: Treponemicidal	Ratio of treponemicidal trypanocidal activities in vitro
Miscellaneous substituents	3-NO_2-4-Cl	106	107	1.0
	p-CH_3	102	102	1.0
	Unsubstituted phenyl arsenoxide	100	100	1.0
	m-Cl	95	110	1.1
	o-Cl	92	83	.9
	o-CH_3	91	84	.9
	p-Cl	90	85	.95
	2,4-diCl	80	100	.8
	3-N=NC_6H_4-4-OH	71	94	1.3
	o-OH	66	84	1.3
	3-NH_2-4-Cl	59	99	1.7
	p-NH_2	57	83	1.5
	2-OH-3-NH_2	41	43	1.05
	p-NHCOC_6H_4NHCOCH_3(p′)	40	32	.8
	p-NHCOCH_3	35	57	1.6
	p-CH_2NHCOCH_3	32	21	.7
	p-NH$SO_2C_6H_4NH_2$(p′)[1]	31	45	1.4
	p-NHCOCH_2NH_2	31	24	.8
	3-OH-4-NH_2	30	41	1.3
	3-NH_2-4-OH	27	38	1.4
	3-NHCOCH_3-4-OH	3.0	24	8.0
Amides and amide substituents.	p-CH=CHCONH_2	73	41	.56
	p-$(CH_2)_2$CONH_2	60	33	.55
	3-NH_2-4-CONH_2	52	36	.7
	3-OH-4-CONH_2	48	45	.9
	p-CONH_2	45	45	1.0
	p-CONHC_2H_4OH	39	22	.6
	m-CONH_2	39	41	1.0
	p-$SO_2N(C_2H_5)_2$	35	101	2.9
	p-CONHCONH_2	34	34	1.00
	p-CH_2CONH_2	31	20	.7
	p-CONHC_6H_4NHCOCH_3(p′)	29	9	.3
	p-NHCONH_2	29	38	1.3
	p-OCH_2CONH_2	26	52	2.0
	p-SO_2NH_2	24	29	1.2
	p-CONHCH_2CN	19.5	27.0	1.4
	p-CONHCH_2CONH_2	15.0	24	1.6
	p-SO_2NHCH_3	12.6	72	5.7
	p-SO_2NHC_2H_4OH	9.0	23	2.6
	m-SO_2NH_2	7.8	21	2.7
	p-CH_2CONHCH_2CONH_2	1.5	10.6	7.0
	p-SO_2NHCH_2CONH_2	1.4	9.8	7.0
	p-CONHCH_2COOH	.22	.7	3.2
Acidic substituents	p-$(CH_2)_3$COOH	54	1.9	.04
	p-CH(C_2H_5)COOH	9.9		
	p-$(CH_2)_5$COOH	7.5	22	3.0
	p-CH_2COOH	4.7	4.2	.9
	p-OCH_2COOH	4.5	5.2	1.15
	3-NH_2-4-COOH	4.0	20	5.0
	o-COOH	3.2	28	8.8
	p-$(CH_2)_2$COOH	2.8	4.1	1.5
	p-CH=CHCOOH	2.0	17	8.5
	p-COOH	.45	6.7	15
	p-CHOHCOOH	.3±	2.8	9
	p-SO_3H	.06	3.4	57

[1] Obtained from the laboratories of the Squibb Institute for Medical Research.

that neither experimental infection can be safely substituted for the other in the evaluation of therapeutic activity.

Most phenyl arsenoxides are active as such, and not by virtue of their conversion to other compounds in vivo. One would therefore anticipate a fairly good correlation between their trypanocidal activity

in vitro and therapeutic action in vivo. Yorke, Murgatroyd, and Hawking (*11*) found such a correlation in the trivalent arsenic compounds studied by them. In the present series of compounds, the trypanocidal activity in vitro has been so closely correlated with therapeutic action in vivo as to constitute a reliable screening pro-

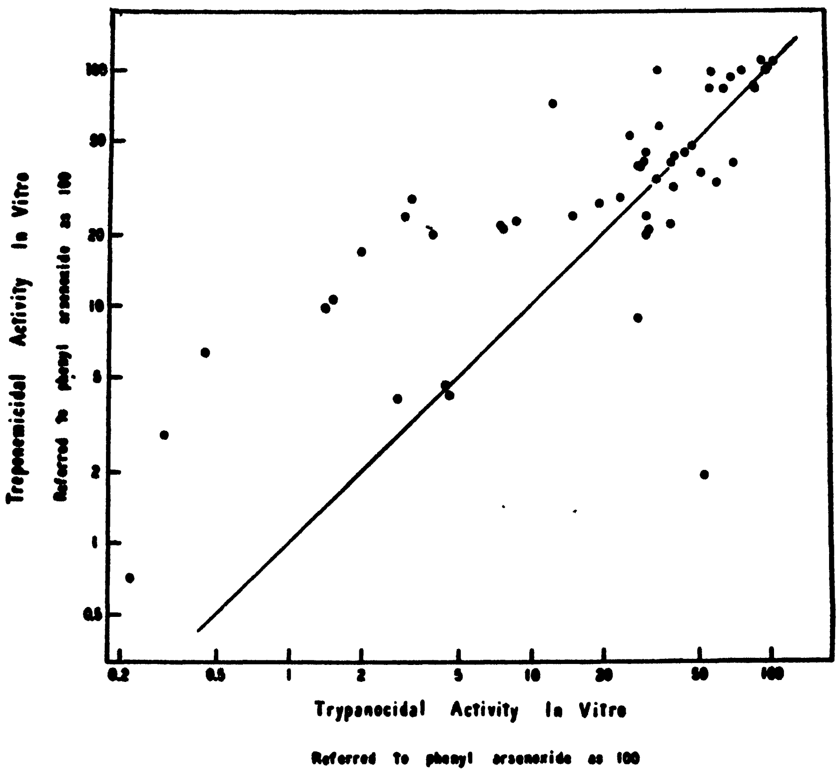


FIGURE 1.—The correlation between the trypanocidal and treponemicidal activity of phenyl arsenoxides in vitro.

TABLE 5.—*Showing the lack of correlation between the therapeutic activity of phenyl arsenoxides in mouse trypanosomiasis and rabbit syphilis*

Compound ($R_1C_6H_4AsO$ or $R_1R_2C_6H_3AsO$)	CD_{50} dose in mouse trypanosomiasis mg./kg.	CD_{50} dose in rabbit syphilis mg./kg.[1]	Ratio of $\frac{\text{treponemicidal}}{\text{trypanocidal}}$ activity
3-NH_2-4-OH	1.6	3.0	0.5
3-NH_2-4-$CONH_2$	1.7	3.7	.5
p-$CH=CHCONH_2$	2.3	>2	>1.0
p-OCH_2CONH_2	3.1	4±	.8
p-$CONH_2$	3.5	2.8	1.3
p-$NHCONH_2$	3.8	4.6	.8
p-$CONHC_6H_4OH$	4.1	10	.4
p-$CONHCH_2CONH_2$	5.0	15	.3
p-SO_2NH_2	7.1	6	1.2
p-$SO_2NHC_6H_4OH$	23	11	2.0
p-$SO_2NHCH_2CONH_2$	36	25±	1.4±

[1] After Eagle, Hogan, Doak, and Steinman (*12*).

ceduro. As shown in table 6 and figure 2, those compounds which are highly active in vitro were active in the treatment of mouse trypanosomiasis;[4] those ineffective in vitro proved relatively inactive in vivo; and as in the case of treponemicidal action (*12*) there was a satisfactory correlation between the two.

TABLE 6.—*The relative trypanocidal activity in vitro and in vivo of a series of phenyl arsenoxides*

Compound tested (RC_6H_4AsO or $R_1R_2C_6H_4AsO$)		Relative trypanocidal action in vitro (molar) referred to that of—: Unsubstituted phenyl arsenoxide as 100 (from table 4)	Relative trypanocidal action in vitro (molar) referred to that of—: p-$CONH_2$ phenyl arsenoxide as 100	Trypanocidal action in vivo: CD_{50} mg./kg.	Trypanocidal action in vivo: Molar activity referred to p-$CONH_2$ phenyl arsenoxide as 100 [1]	Ratio of activities in vivo / in vitro
Miscellaneous substituents.	Unsubstituted phenyl arsenoxide	100	222	>3	-------	-------
	p-NH_2	57	127	>4	<100	-------
	2-OH-3-NH_2	41	91	2.9	104	1.1
	p-$NHCOC_6H_4NHCOCH_3$	40	89	4.2	125	1.4
	p-$CH_2NHCOCH_3$	32	71	3.3	100	1.4
	3-NH_2-4-OH	27	60	1.6	246	4.1
	3-$NHCOCH_3$-4-OH	3.0	6.7	7.1	60	9.0
Amides and amide derivatives.	p-$CH{=}CHCONH_2$	73	162	2.3	158	1.0
	p-$(CH_2)_3CONH_2$	60	133	2.4	165	1 3
	3-NH_2-4-$CONH_2$	52	115	1.66	210	1.1
	3-OH-4-$CONH_2$	48	106	1.7	223	2.1
	p-$CONH_2$	45	100	3.3	100	1.00
	p-$CONHC_2H_4OH$	39	87	4.1	95	1.1
	p-$CONHCONH_2$	34	75	4.5	92	1.2
	p-$CONHC_6H_4NHCOCH_3$(p′)	29	65	6.2	85	1 3
	p-$NHCONH_2$	29	65	3.8	99	1.5
	p-OCH_2CONH_2	26	58	3.1	128	2.2
	p-SO_2NH_2	24	53	7.1	56	1.1
	p-$CONHCH_2CONH_2$	15	33	5.0	81	2.5
	p-$SO_2NHC_2H_4OH$	9.0	20	23	20	1.0
	p-$CH_2CONHCH_2CONH_2$	1.5	3.3	15	33	10.0
	p-$SO_2NHCH_2CONH_2$	1.4	3.1	35.6	13	4.2
	p-$CONHCH_2COOH$	22	.5	>24	<18	-------
Acidic substituents.	p-$(CH_2)_3COOH$	54	113	1.6	242	2.0
	p-CH_2COOH	4.7	10.4	7.3	48	4.6
	p-OCH_2COOH	4.5	10	7.7	48	4.8
	p-$(CH_2)_2COOH$	2.8	6.2	11	34	5.5
	p-SO_3H	.06	.1	>32	<15	-------

[1] This compound arbitrarily used as reference base instead of the unsubstituted phenyl arsenoxide. The latter was not curative even in sublethal doses.

Despite the good qualitative agreement between trypanocidal action in vitro and in vivo, it is to be noted that weakly active compounds were regularly more effective in vivo than might have been anticipated from their trypanocidal activity. This is shown in the last column of table 6 and in figure 3, in which trypanocidal action in vitro is plotted against the ratio of $\frac{\text{therapeutic activity in vivo}}{\text{trypanocidal action in vitro}}$ activities. The less active the compound in vitro (left side of figure), the higher was that ratio. This puzzling observation may be related

[4] It is to be noted in table 5 and figure 2 that the unsubstituted phenyl arsenoxide could not be used as the reference compound in the in vivo assays, since it failed to cure even in sublethal doses.

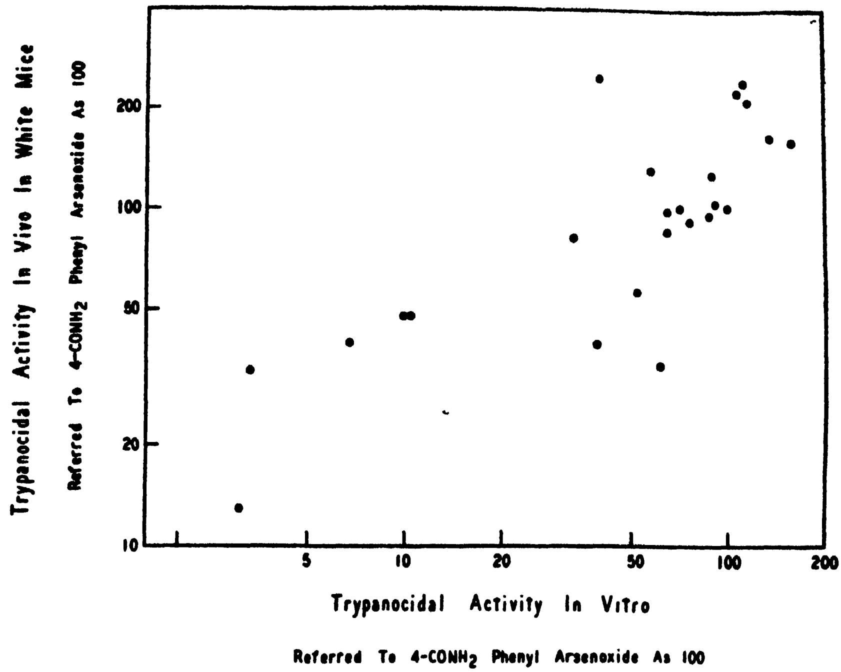


FIGURE 2.--The correlation between the trypanocidal activity of phenyl arsenoxides in vitro and in vivo

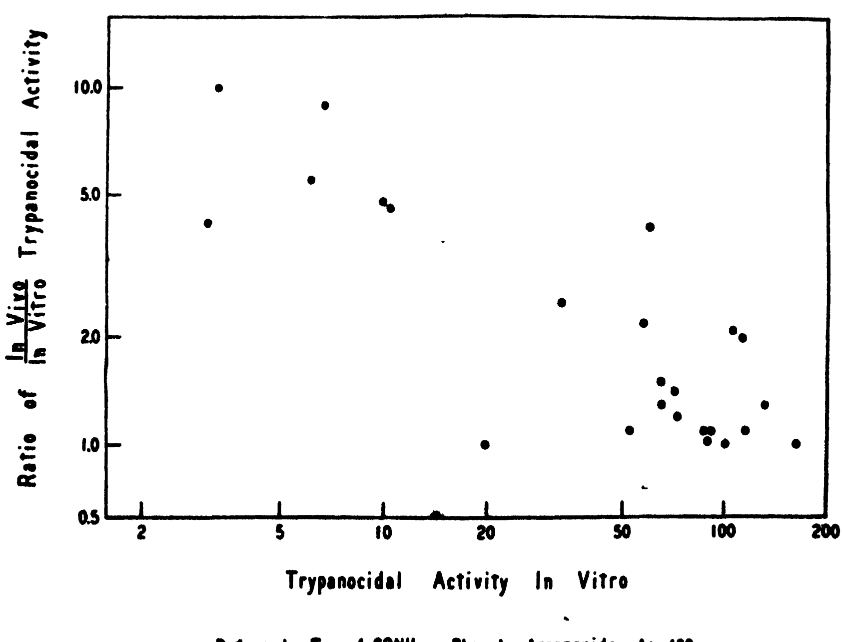


FIGURE 3.– Showing that weakly trypanocidal phenyl arsenoxides are more effective in vivo than would be suggested by their direct trypanocidal activity.

to the fact that most of these compounds are relatively nontoxic and are therefore not bound by the tissues as rapidly or as completely as the more toxic derivatives of phenyl arsenoxide (*14*). Under such circumstances they may remain free in the tissue fluids at higher concentrations and for longer periods and thus exert a trypanocidal effect considerably in excess of that anticipated on the basis of their intrinsic trypanocidal activity. Nevertheless, if due cognizance is taken of this factor, the trypanocidal activity of phenyl arsenoxides in vitro apparently offers a helpful orientation to their therapeutic activity in vivo.

B. THERAPEUTIC ACTIVITY AND CHEMOTHERAPEUTIC INDEX IN MICE AND RABBITS

Twenty-nine of the present series of compounds were tested in the treatment of experimental trypanosomiasis in white mice. Their toxicity, therapeutic activity, and chemotherapeutic index, expressed both as $\frac{\text{maximal tolerated dose}}{\text{minimal curative dose}}$ and $\frac{LD_{50}}{CD_{50}}$, are given in table 7, in which the compounds are arranged in the order of decreasing chemotherapeutic index. For comparison, the corresponding values for a series of arsonic acids are given in table 8. As previous workers have found, the phenyl arsenoxides were regularly far more effective than the corresponding arsonic acids, only 1/60 to 1/300 as much being required to effect cure. Because of that greater activity, and despite their higher toxicity, the arsenoxides regularly gave a more favorable margin between the curative and toxic levels, exceeding two- to sevenfold that provided by the corresponding arsonic acids. This is contrary to the findings of Gough and King (*13*) who, comparing the chemotherapeutic index $\left(\frac{\text{maximum tolerated dose}}{\text{minimum curative dose}}\right)$ of phenyl arsonic acids and the corresponding arsenoxides in the treatment of mouse trypanosomiasis (*Tryp. equiperdum*), found no significant difference in the case of the p-$CONH_2$ and p-SO_2NH_2 compounds and some of their derivatives.

The four phenyl arsenoxides in our series which gave the best indices in mouse trypanosomiasis, and two phenyl arsonic acids, were also tested in the treatment of rabbit trypanosomiasis. The latter chronic tissue disease was usually more difficult to cure than the acute blood infection of mice (compare col. 4 of table 7 and col. 5 of table 9). In addition, the arsenic compounds were several times more toxic in rabbits.[5] In consequence, the chemotherapeutic indices of both pentavalent and trivalent arsenicals in rabbit trypano-

[5] The apparently higher LD_{50} values of table 9 represent the *total* amount administered in four daily injections.

TABLE 7.—*The toxicity, therapeutic efficacy and chemotherapeutic index of phenyl arsenoxides in the treatment of mouse trypanosomiasis* (Tryp. equiperdum)

Phenyl arsenoxides tested (RC_6H_4AsO or $R_1R_2C_6H_3AsO$)	Toxicity		Therapeutic activity		Chemotherapeutic index	
	LD_{50} [1] mg./kg.	MTD [1] mg./kg.	CD_{50} [1] mg./kg.	MCD [1] mg./kg.	$\frac{LD_{50}}{CD_{50}}$	$\frac{MTD}{MCD}$
3-NH_2-4-OH ("mapharsen")	42.6	33.6	1.6	3.4	26.6	9.9
3-NH_2-4-$CONH_2$	47	39	1.7	4.3	28.3	9.0
p-$(CH_2)_2COOH$	33.4	26	1.6	3.4	20.5	7.6
p-$CONHCH_2CONH_2$	80	64	5.0	9.5	16.0	6.7
p-$CONHC_2H_4OH$	64	51	4.1	7.6	15.7	6.7
p-$CONHCONH_2$	48.4	40	4.5	7.7	10.8	5.2
p-$CH_2NHCOCH_3$	38	29	3.3	6.2	11.5	4.7
p-$NHCOC_6H_4NHCOCH_3$	59	41	4.2	10±	14.1	4.1±
p-SO_2NH_2	63	42	7.1	11.3	8.9	3.7
p-$(CH_2)_2CONH_2$	21.6	15.0	2.4	4.2	9.0	3.5
3-OH-4-$CONH_2$	12.3	9.5±	1.7	2.85	7.2	3.3
p-$CH_2CONHCH_2CONH_2$	109	85±	15.0	26.0	7.2	3.2
p-$CH=CHCONH_2$	28	20	2.3	6.8	12.2	3.0
p-$NHCONH_2$	35	24	3.8	8.0	9.2	3.0
p-OCH_2CONH_2	33	17	3.1	6.6	10.7	2.6
p-$SO_2NHC_2H_4OH$	84	71	23.0	33.0	3.6	2.1
p-$CONH_2$	27.5	17	3.5	8.6	7.9	2.0
p-$(CH_2)_2COOH$	38.8	30	11.0	16.7	3.5	1.8
3-$NHCOCH_3$-4-OH	25.5	18.1	7.1	13.0	3.5	1.4
p-$SO_2NHCH_2CONH_2$	100	64	36.0	52.0	2.8	1.2
p-OCH_2COOH	11.1	8.2	7.7	14.0	1.5	0.6
Unsubstituted phenyl arsenoxide	3	1.5	>3.0	>3.0	<1.0	<1.0
p-$CONHCH_2COOH$	21.2	14	>24.0	>24.0	<0.9	<0.8
p-CH_2COOH	6 4	4.3	7.3	>8.0	0.9	<0.5
p-SO_3Na	13	9.4	>32.0	>32.0	<0.4	<0.3

[1] LD_{50}=dose which killed half of animals.
MTD=maximal tolerated dose (<5 percent killed).
CD_{50}=dose which cured half of animals.
MCD=minimal curative dose (>95 percent cured).

TABLE 8.—*The toxicity, therapeutic efficacy, and chemotherapeutic index of phenylarsonic acids in the treatment of mouse trypanosomiasis* (Tryp. equiperdum)

Phenylarsonic acids tested ($R_1C_6H_4AsO_3H_2$ or $R_1R_2C_6H_3AsO_3H_2$)	Toxicity		Therapeutic activity		Chemotherapeutic index		Chemotherapeutic index of corresponding phenyl arsenoxide (from table 7)	
	LD_{50} [1] mg./kg.	MTD [1] mg./kg.	CS_{50} [1] mg./kg.	MCD [1] mg./kg.	$\frac{LD_{50}}{CD_{50}}$	$\frac{MTD}{MCD}$	$\frac{LD_{50}}{CD_{50}}$	$\frac{MTD}{MCD}$
3-NH_2-4-OH-	2,400	1,300	260	380	9	3.4	26.6	9.9
p-OCH_2CONH_2-	2,000±	1,200±	350	420	5.7	3.0	10.7	2.6
p-$CONHCH_2CONH_2$-	7,000±	5,400±	1,500	2,800	5±	2±	16.0	6.7
p-OH-	1,600	900	300	600	5.3	1.5	-------	-------
p-$NHCH_2CONH_2$- (tryparsamide)	3,750	2,500	950	1,550	4.0	1.6	-------	-------
p-NH_2-	480	300	120	200	4.0	1.5	-------	-------
p-$(CH_2)_2COOH$-	345	220	94	200±	3.7	1±	20.7	7.6
p-SO_2NH_2-	2,200	1,400	634	1,200	3.5	1.2	8.9	3.7
3-$NHCOCH_3$-4-OH- ("Stovorsal")	2,800	1,500	2,000	2,400	1.4	<1	3.5	1.4
Unsubstituted phenylarsonic acid	42	30	>40	>40	<1	<1	<1	<1

[1] LD_{50}=dose which killed 50 percent of the animals in 4 days.
MTD=maximal tolerated dose (<5 percent mortality).
CD_{50}=dose which cured 50 percent of the animals (30-day observation).
MCD=minimal curative dose (>95 percent cure).

somiasis were usually less favorable than in the mouse infection. The trivalent phenyl arsenoxides again proved many times more effective than the arsonic acids, only 4 to 16 mg. per kg. of the former being required to cure 50 percent of the animals, as compared with

approximately 600 mg. per kg. of the two arsonic acids. However, because of the higher toxicity of the arsenoxides, their chemotherapeutic indices in rabbits were only slightly greater than those of the arsonic acids. Of the six selected compounds tested in rabbits, the best index was given by the p-$(CH_2)_3COOH$ phenyl arsenoxide, with an $\frac{LD_{50}}{CD_{50}}$ ratio of 4 4 as compared with one of 2.8 tryparsamide.

TABLE 9.—*The toxicity, therapeutic efficacy and chemotherapeutic index of arsenicals in rabbit trypanosomiasis*

[Four successive daily intravenous injections]

Type of compound tested	Substituents	Toxicity [1] LD50 mg./kg.	Toxicity [1] MTD mg./kg.	Therapeutic efficacy [1] CD50 mg./kg.	Chemotherapeutic index in rabbits $\frac{LD_{50}}{CD_{50}}$	Chemotherapeutic index in mice $\frac{LD_{50}}{CD_{50}}$ [2]
Phenyl arsenoxides	p-$(CH_2)_3COOH$	16	8	3 6	4 4	20 5
	3-NH_2-4-OH (mapharsen)	42	31	12±	3 5	26 6
	3-NH_2 4-$CONH_2$	38	25	16±	2 4	28 3
	p-$CONHCH_2CONH_2$	64	48	30 0	2 1	16 0
Phenylarsonic acids	3-NH_2-4 OH	400	250	600±	<1	9 0
	p-$NHCH_2CONH_2$ (tryparsamide)	1,800	1,200	640	2 8	4 0

[1] The values listed in these columns are the total dosages given over the 4-day period

[2] From table 7

C. CORRELATIONS BETWEEN CHEMICAL STRUCTURE AND CHEMOTHERAPEUTIC ACTIVITY

The unsubstituted phenyl arsenoxide was one of the most actively trypanocidal and toxic compounds in the present series Substituent groups usually served only to decrease those two properties, and to varying degrees (table 10). In general, substitution with NO_2, Cl, or CH_3 groups had no significant effect on either trypanocidal activity in vitro or, as previously reported (*2*), on toxicity. Similarly, although the compounds with a single -OH or -NH_2 group were somewhat less toxic than the parent compound, they were usually correspondingly less active. These compounds, like the parent phenyl arsenoxide, would therefore be of no value in the treatment of trypanosomiasis.

There follows in table 10 an intermediate series of compounds in which the substituent group reduced toxicity to a greater degree than it did trypanocidal activity, with the result that the compound had a favorable chemotherapeutic index. Those compounds fell into three general classes: compounds with terminal acetamide groups, aminophenols, and amide- substituted compounds and their derivatives.

All but one of the five acetamido-compounds studied had favorable $\frac{\text{activity}}{\text{toxicity}}$ ratios, due in large measure to the detoxifying effect of the

TABLE 10.—*Correlations between the chemical structure of phenyl arsenoxides and their chemotherapeutic activity* (Tryp. equiperdum)

General type of substituent group	Specific compound	Molar trypanocidal action in vitro, referred to phenyl arsenoxide as 100	Molar toxicity in white mice, referred to phenyl arsenoxide as 100	Ratio of trypanocidal activity in vitro: toxicity, referred to phenyl arsenoxide as 1	Chemotherapeutic index $\left(\frac{LD_{50}}{CD_{50}}\right)$ in mouse trypanosomiasis
Unsubstituted phenyl arsenoxide (reference compound).	------	100	100	1	No cures in sublethal doses.
NO_2, Cl, CH_3 ("Indifferent" substituents).	3-NO_2-4-Cl	106	100	1.06	------
	p-CH_3	102	118	.85	------
	m-Cl	95	110	.86	------
	o-Cl	92	77	1.2	------
	o-CH_3	91	88	1.04	------
	p-Cl	90	98	.92	------
	2, 4-diCl	80	100	.8	------
Terminal -NH_2 and -OH	m-N=NC_6H_4OH(p')	71	60	1.2	------
	o-OH	66	85	.8	------
	3-NH_2-4-Cl	59	94	.6	------
	p-NH_2	57	57	1.0	------
	p-$NHSO_2C_6H_4NH_2$(p')	31	14	2.2	------
	p-$NHCOCH_2NH_2$	31	13.5	2.3	------
Terminal acetamide group	p-$NHCOC_6H_4NHCOCH_3$(p')	40	6.7	6.0	14
	p-$NHCOCH_3$	35	20.5	1.7	------
	p-$CH_2NHCOCH_3$	32	7.3	4.4	11.5
	p-$CONHC_6H_4NHCOCH_3$(p')	12.3	2±	6±	------
	3-$NHCOCH_3$-4-OH	3.0	12.4	.25	3.5
Aminophenols	2-OH-3-NH_2	41	79	.5	------
	3-OH-4-NH_2	30	10.5	3.0	------
	3-NH_2-4-OH	27	6.9	4.0	26.6
Terminal amides	p-CH=$CHCONH_2$	73	9.8	7.4	12.2
	p-$(CH_2)_2CONH_2$	60	13.5	4.4	9.0
	3-NH_2-4-$CONH_2$	52	5.6	9.1	28.3
	3-OH-4-$CONH_2$	48	23	2.1	7.2
	p-$CONH_2$	45	9.6	4.7	7.9
	p-$CONHCONH_2$	34	6.4	5.0	10.8
	p-CH_2CONH_2	31	8.7	3.6	------
	p-$NHCONH_2$	29	8.1	3.6	9.8
	p-OCH_2CONH_2	26	9.0	2.9	10.7
	p-SO_2NH_2	24	4.8	5.0	8.9
	p-$CONHCH_2CONH_2$	15	3.9	3.9	16
	m-SO_2NH_2	7.8	6.1	1.3	8.9
	p-$CH_2CONHCH_2CONH_2$	1.5	3.4	.43	7.2
	p-$SO_2NHCH_2CONH_2$	1.4	3.5	.4	2.8
Substituted amides	p-$CONHC_2H_4OH$	39	4.56	8.5	15.7
	p-$SO_2N(C_2H_5)_2$	35	134	.3	------
	p-$CONHC_6H_4NHCOCH_3$	29	2±	15±	------
	p-$CONHCH_2CN$	20	4.53	4.4	------
	p-SO_2NHCH_3	12.6	17.6	.7	------
	p-$SO_2NHC_2H_4OH$	9	4.2	2.2	3.6
	p-$CONHCH_2COOH$	.22	15.6	.01	<1
Acidic groups	p-$(CH_2)_3COOH$	54	8.8	6.1	20.5
	p-$CH(C_2H_5)COOH$	9.9	19.5	.5	------
	p-$(CH_2)_5COOH$	7.5	8.1	.9	------
	p-CH_2COOH	4.7	41	.11	<.9
	p-OCH_2COOH	4.5	25	.2	1.5
	3-NH_2-4-COOH	4.0	15	.3	------
	o-COOH	3.2	27	.1	------
	p-$(CH_2)_2COOH$	2.8	7.3	.4	3.5
	p-CH=CHCOOH	2.0	9.4	.2	------
	p-COOH	.45	41.4	.01	------
	p-CH(OH)COOH	.35	7.0	.05	------
	p-$CONHCH_2COOH$	.22	15.6	.015	<.9
	p-SO_3H	.06	29	.002	<.4

terminal -$NHCOCH_3$ linkage (cf. (*2*)). The exception was the 3-$NHCOCH_3$-4-OH compound, which was relatively nontoxic but inactive both in vitro and in vivo.

The three aminophenols tested were actively trypanocidal; but the 3-NH_2-4-OH compound, because of its paradoxically low toxicity, gave the most favorable $\frac{\text{activity}}{\text{toxicity}}$ ratio. This confirms the results obtained in the assay of treponemicidal activity (*2*). In mouse trypanosomiasis it gave the highest $\frac{LD_{50}}{CD_{50}}$ index of all the phenyl arsenoxides tested. In rabbits, however, this compound was less active and gave a lower chemotherapeutic index than the p-$(CH_2)_3COOH$ arsenoxide discussed in a following paragraph.

The favorable effect of amide-substitution on the chemotherapeutic activity of phenylarsonic acids and phenyl arsenoxides has been pointed out by Gough and King (*13*). In the present series of phenyl arsenoxides also, amide-substitution regularly resulted in compounds with a favorable index, whether against spirochetes (*2*, *12*) or, as here found, against trypanosomes. This favorable effect was due primarily to the detoxifying effect of the amide-linkage, the molar toxicities of the 14 such compounds in the present series varying between 2.3 and 24 percent that of phenyl arsenoxide. Although their direct trypanocidal activity varied within wide limits, from 0.55 to 73 percent that of the unsubstituted phenyl arsenoxide, the ratio of $\frac{LD_{50}}{CD_{50}}$ varied between 2.8 and 28.3.

The effect of substitution in the amide groups on the chemotherapeutic properties of phenyl arsenoxides has been discussed in detail in a preceding communication in relation to treponemicidal action (*2*, *12*). As there indicated, and confirmed for the few such compounds studied with respect to trypanocidal action, replacement of an amide hydrogen with a -CH_3, a -C_2H_5 group, or with a group containing a terminal -COOH, caused a shift in the properties of the compound toward those characteristic of the new terminal group, with an increase in toxicity and a lower $\frac{\text{activity}}{\text{toxicity}}$ ratio. On the other hand, similar substitution with groups containing a terminal hydroxyl, acetamido, or nitrile linkage usually affected both activity and toxicity to approximately the same degree, so that the favorable influence of the amide group was not adversely affected.

Of the disubstituted compounds, the 3-NO_2-4-Cl, 3-NH_2-4-Cl, and 2,4-diCl, each with two "indifferent" substituents, had the expected high toxicity, high activity, and an $\frac{\text{activity}}{\text{toxicity}}$ ratio not significantly different from that of the unsubstituted compounds. In the case of

the $3\text{-}NH_2\text{-}4\text{-}CONH_2$ compound, the detoxifying effect of the benzamide group was enhanced by the adjacent amino group, resulting in a compound with a highly favorable chemotherapeutic index. In the analogous $3\text{-}OH\text{-}4\text{-}CONH_2$ compound, however, the detoxifying effect of the amide group was impaired by the adjacent hydroxyl group, without a commensurate increase in activity. In both cases the effect of the second group on trypanocidal activity corresponded with that observed in the assay of treponemicidal activity (*12*).

As was true in the case of spirocheticidal action, acidic substituents usually caused a striking decrease in trypanocidal activity. Of the 13 such compounds included in the present series and listed at the bottom of table 10, 12 (the $p\text{-}SO_3H$, o-COOH, p-COOH, p-CH(OH)COOH, $p\text{-}CH_2COOH$, $p\text{-}(CH_2)_2COOH$, p-CH=CHCOOH, $p\text{-}CH(C_2H_5)COOH$, $p\text{-}(CH_2)_5COOH$, $p\text{-}OCH_2COOH$, $p\text{-}CONHCH_2COOH$, and $3\text{-}NH_2\text{-}4\text{-}COOH$ phenyl arsenoxides) had molar trypanocidal activities varying between 0.06 and 9.9 percent that of the parent phenyl arsenoxide. Although their toxicity was also reduced, it was usually not sufficiently low to give the compounds a favorable chemotherapeutic index. Of 5 such compounds studied in mouse trypanosomiasis, 3 failed to cure even at sublethal levels, and in the other 2 the ratios of $\frac{LD_{50}}{CD_{50}}$ were 3.5 and 1.5.

As seen in comparing any acid in table 10 with the corresponding amide, the striking decrease in the trypanocidal activity of phenyl arsenoxide caused by acid substituents was largely counteracted by conversion to the amide. As will be shown in detail in a following paper, the inhibitory effect of acidic groups is related to the failure of the charged anion to combine with the cell and thus exert its parasiticidal action.

The sole exception to the marked inhibitory effect of acidic substitution on trypanocidal action was provided by the $p\text{-}(CH_2)_3COOH$ phenyl arsenoxide, which from the chemotherapeutic point of view is the most promising compound so far studied. The experimental data with this compound are summarized in table 11. In vitro, its trypanocidal activity was 54 percent that of the unsubstituted compound. In the treatment of mouse trypanosomiasis, it was one of the most active compounds of the series, a single injection of 1.6 mg. per kg. curing 50 percent, and 3.4 mg. per kg. curing more than 95 percent of the mice. The chemotherapeutic index $\frac{LD_{50}}{CD_{50}}$ in that species was 20.5, the third highest in the entire series of compounds studied. In the treatment of rabbit trypanosomiasis, this compound was the most active of the six selected compounds studied (CD_{50} in four daily injections=3.6 mg. per kg.), and gave the

TABLE 11.—*The trypanocidal activity in vitro and in vivo, toxicity, and chemotherapeutic index of p-arsenoso-phenylbutyric acid, compared with that of tryparsamide*

[All dosages are expressed in mg./kg. In the rabbits, treated by 4 daily injections, the dosages listed are the totals over the 4-day period.]

CD_{50}=dose which cured half of animals.
MCD ("minimum curative dose")=dose which cured >95 percent.
LD_{50}=dose which killed half of animals.
MTD ("maximal tolerated dose")=dose which killed <5 percent.

	White mice (Acute blood infection, treated by single intraperitoneal injection)						Rabbits (Chronic tissue infection, treated by 4 intravenous injections at 24-hour intervals)			
	Therapeutic activity		Toxicity		Chemotherapeutic index		Therapeutic activity	Toxicity		Chemotherapeutic index
	CD_{50}	MCD	LD_{50}	MTD	$\frac{LD_{50}}{CD_{50}}$	$\frac{MTD}{MCD}$	CD_{50}	LD_{50}	MTD	$\frac{LD_{50}}{CD_{50}}$
p-Arsenoso-phenylbutyric acid.	1.6	3.4	33	26	21	7.6	3.6	16	8	4.4
Tryparsamide......	940	1,560	3,750	2,500	4.0	1.6	640	1,800	1,200	2.8

most favorable chemotherapeutic index (the ratio of $\frac{LD_{50}}{CD_{50}}=4.4$). Were it not for its unexpectedly high toxicity in rabbits, exceeding fivefold that observed in mice, the superiority of this compound would have been even more striking. As will be shown in detail in a following paper, it has the further important property of being effective against strains of trypanosomes resistant to most other arsenicals.

No ready explanation can be given for the high activity of this compound. It is to be noted (cf. table 10) that the homologous series consisting of the p-COOH, p-CH_2COOH, p-$(CH_2)_2COOH$, p-$(CH_2)_3COOH$, and p-$(CH_2)_5COOH$ phenyl arsenoxides had molar trypanocidal activities in vitro of 0.45, 4.7, 2.8, 54, and 7.5, respectively. The corresponding values for molar toxicity in mice were 41, 41, 7.3, 8.8, and 8.1. In neither activity nor toxicity is the series progressive, and the high trypanocidal action of the p-$(CH_2)_3COOH$ compound is anomalous.

Whether the high activity of the butyric acid compound extends to species of trypanosomes pathogenic for man, and if so, whether it is effective in the chronic as well as in the early stage of the human infection, are points now being investigated. Its high activity in the experimental rabbit infection, which resembles the chronic disease of man in that the tissues themselves are involved in a chronic inflammatory process, is of promise in this connection.

III. Summary

1. Fifty-four phenyl arsenoxides were assayed with respect to trypanocidal action (*Tryp. equiperdum*) in vitro. The toxicity and

therapeutic efficacy of 26 were studied in white mice, and 4 were further assayed in the treatment of rabbit trypanosomiasis. For comparison, 9 arsonic acids were assayed in mouse trypanosomiasis, and 2 in the rabbit disease.

2. Although there was a rough correlation between the trypanocidal and treponemicidal activity of phenyl arsenoxides, the two assays were sometimes wholly discrepant. There was a sufficiently close correlation between the trypanocidal activity in vitro and in vivo to justify the use of the former as a screening procedure with respect to therapeutic activity. Weakly active compounds were, however, usually more effective in vivo than would have been anticipated from their direct trypanocidal action.

3. Phenyl arsenoxides regularly gave a more favorable chemotherapeutic index in the treatment of mouse trypanosomiasis than the corresponding arsonic acids. The chemotherapeutic index $\left(\frac{LD_{50}}{CD_{50}}\right)$ of nine arsonic acids varied between 1.4 and 9, to be compared with indices of 3.5 to 26 for the corresponding arsenoxides. In the treatment of rabbit trypanosomiasis, the difference was not as marked but was again in favor of phenyl arsenoxides.

4. Various types of substituents have had fairly regular effects on the trypanocidal activity, toxicity, and thus on the chemotherapeutic index of phenyl arsenoxide.

(*a*) Nitro, chloro, methyl, amino, and hydroxyl groups had no significant effect on the activity: toxicity ratio.

(*b*) Acidic groups usually caused a striking decrease in trypanocidal action.

(*c*) Amide-substituted compounds, or those with a substituent containing a terminal acetamide group, were uniformly low in toxicity, and usually had a favorable activity: toxicity ratio, varying up to 7.4 times that of the unsubstituted compound. In the treatment of mouse trypanosomiasis the chemotherapeutic index $\left(\frac{LD_{50}}{CD_{50}}\right)$ of such compounds varied between 2.8 and 28.3, the corresponding index for the unsubstituted phenyl arsenoxide being less than 1.1

(*d*) Substituting an amide hydrogen with $-CH_3$ or $-C_2H_5$ reacted unfavorably on the activity: toxicity ratio of the compound; but similar substitution with a group containing a terminal hydroxyl, acetamide, or nitrile linkage did not adversely affect the favorable effect of the amide group.

5. The most promising compound in the present series was the p-$(CH_2)_2COOH$ phenyl arsenoxide. This compound was an exception to the inhibitory effect of acidic-substituents on trypanocidal activity and had a molar activity in vitro 54 percent that of the unsub-

stituted compound. The LD_{50} value in mice on single intraperitoneal injection was 33.4 mg. per kg., the CD_{50} value in that species was 1.6 mg./kg., and the $\frac{LD_{50}}{CD_{50}}$ ratio of 20.5 was the third highest in the entire series. In rabbit trypanosomiasis treated by four consecutive daily injections, the LD_{50} value was 16 mg. per kg., the CD_{50} was 3.6 mg./kg., and the $\frac{LD_{50}}{CD_{50}}$ index was 4.4, the highest of all the compounds tested. The efficacy of this compound against strains of trypanosomes pathogenic for man is now under investigation.

REFERENCES

(1) Doak, G. O., Eagle, H., and Steinman, H. G.: The preparation of phenyl arsenoxides in relation to a projected study of their chemotherapeutic activity. I. Monosubstituted derivatives. J. Am. Chem. Soc., **62:** 168 (1940).

Doak, G. O., Steinman, H. G., and Eagle, H.: The preparation of phenyl arsenoxides. IV. Disubstituted compounds. J. Am. Chem. Soc., **63:** 99 (1941).

Doak, G. O., Eagle, H., and Steinman, H. G.: Arsine oxides of naphthalene and biphenyl. J. Am. Chem. Soc., **64:** 1064 (1942).

(2) Eagle, H., Hogan, R. B., Doak, G. O., and Steinman, H. G.: The toxicity, treponemicidal activity, and potential therapeutic utility of substituted phenyl arsenoxides. III. Monosubstituted compounds: Acids, esters, benzophenone, methylsulfone. J. Pharm. & Exp. Therap., **70:** 221 (1940).

———: The effect of multiple substituents on the toxicity and treponemicidal activity of phenyl arsenoxide, Ibid, **74:** 210 (1942).

———: Amide-substituted phenylarsine oxides and their derivatives: A group of compounds of possible utility in the treatment of syphilis. J. Am. Chem. Soc., **65:** 1236 (1943).

(3) Yorke, W., and Murgatroyd, F.: Studies in chemotherapy. III. The action in vitro of certain arsenical and antimonial compounds on *T. rhodesiense* and on atoxyl- and acriflavine-resistant strains of this parasite. Ann. Trop. Med. & Parasitol., **24:** 449 (1930).

(4) Eagle, H.: The toxicity, treponemicidal activity, and potential therapeutic utility of substituted phenyl arsenoxides. I. Methods of assay. J. Pharm. & Exp. Therap., **69:** 342 (1940).

(5) Reed, L. S., and Muench, H.: A simple method of estimating 50 percent end points. Am. J. Hyg., **27:** 493 (1938).

(6) Pearce, L., and Brown, W. H.: Experimental trypanosomiasis: its application in chemotherapeutic investigations. J. Exper. Med., **28:** 109 (1918).

(7) Kolmer, J. A., Kast, C., and Rule, A.: Spirocheticidal, trypanocidal, and mechanism of activity of organic arsenical compounds in vitro and in vivo in relation to therapeutic effectiveness. Am. J. Syph., **24:** 201 (1940).

(8) Ehrlich, P., and Hata, S.: The Experimental Chemotherapy of Spirilloses. Redman and Company, New York, 1911, p. 126.

(9) Probey, T. F., and McCoy, G. W.: Relation between trypanocidal and spirocheticidal activities of neoarsphenamine. Pub. Health Rep., **45:** 1716 (1930).

(10) Hawking, F.: Contributions on the mode of action of germanin (Bayer 205). Ann. Trop. Med. & Parasitol., **33:** 1 (1939).

(11) Yorke, W., Murgatroyd, F., and Hawking, F.: Studies in chemotherapy. IV. The action in vivo of certain arsenical and antimonial compounds and of Bayer 205 on *T. rhodesiense* and on atoxyl- and acriflavine-resistant strains of this parasite. Ann. Trop. Med. & Parasitol., **25:** 313 (1931).

———: V. Preliminary contribution on the nature of drug-resistance. Ibid, **25:** 351 (1931).

(12) Eagle, H., Hogan, R. B., Doak, G. O., and Steinman, H. G.: The toxicity and treponemicidal activity of amide-substituted phenyl arsenoxides and their derivatives. J. Pharm. & Exp. Therap. (in press).
(13) Gough, G. A. C., and King, H.: Trypanocidal action and chemical constitution. IX. Aromatic acids containing an amide group. J. Chem. Soc., 669 (1930).
(14) Hogan, R. B., and Eagle, H.: The pharmacologic basis for the widely varying toxicity of arsenicals. J. Pharm. & Exp. Therap., 80: 93 (1944).

DEATHS DURING WEEK ENDED JUNE 3, 1944

[From the Weekly Mortality Index, issued by the Bureau of the Census, Department of Commerce]

	Week ended June 3, 1944	Corresponding week, 1943
Data for 93 large cities of the United States:		
Total deaths	8,436	9,005
Average for 3 prior years	8,496	
Total deaths, first 22 weeks of year	213,762	217,680
Deaths under 1 year of age	597	660
Average for 3 prior years	587	
Deaths under 1 year of age, first 22 weeks of year	13,778	15,133
Data from industrial insurance companies:		
Policies in force	66,588,800	65,548,808
Number of death claims	10,648	10,286
Deaths claims per 1,000 policies in force, annual rate	8.4	8.2
Death claims per 1,000 policies, first 22 weeks of year, annual rate	10.8	10.4

PREVALENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED JUNE 10, 1944

Summary

A total of 314 cases of meningococcus meningitis was reported for the current week, as compared with 274 last week, 382 for the corresponding week last year, and a 5-year (1939-43) median of 32. While the general trend is downward, the incidence fluctuates from week to week. Increases were reported currently in all of the 9 geographic areas except the West North Central, Mountain, and Pacific. Seven States, with reports of 19 to 36 cases each, reported an aggregate of 186 cases, as compared with 154 for the same States last week. The cumulative total since the week ended March 4, the last week in which the total exceeded the corresponding figure for last year, is 6,124, as compared with 7,344 for the same period last year.

A total of 41 cases of poliomyelitis was reported, as compared with 46 last week, 60 for the corresponding week last year, and a 5-year median of 54. The largest numbers of cases were reported in California (9), Louisiana (7), Kentucky (5), and New York (4). The total reported to date is 588, as compared with 659 for the same period last year and a 5-year median of 556.

Of a total of 104 cases of typhoid fever, as compared with 83 last week and a 5-year median of 124, 9 occurred in Oklahoma, 8 each in Texas and California, and 6 each in New York, Pennsylvania, Illinois, and Tennessee. The total for the year to date is 1,792, as compared with 1,425 last year and a 5-year median of 1,947.

Decreases were reported currently for the other 6 of the 9 common communicable diseases included in the following table, and only for scarlet fever is the current incidence above the corresponding 5-year median. Cumulative figures, however, for only diphtheria, smallpox, typhoid fever, and whooping cough are below the corresponding 5-year medians.

A total of 8,360 deaths was recorded for the week in 93 large cities of the United States, as compared with 8,436 last week and 8,445 for the 3-year (1941–43) average. The total for the year to date is 222,122, as compared with 226,890 for the same period last year.

Telegraphic morbidity reports from State health officers for the week ended June 10, 1944, and comparison with corresponding week of 1943 and 5-year median

In these tables a zero indicates a definite report, while leaders imply that, although none was reported, cases may have occurred.

Division and State	Diphtheria Week ended— June 10, 1944	Diphtheria Week ended— June 12, 1943	Diphtheria Median 1939–43	Influenza Week ended— June 10, 1944	Influenza Week ended— June 12, 1943	Influenza Median 1939–43	Measles Week ended— June 10, 1944	Measles Week ended— June 12, 1943	Measles Median 1939–43	Meningitis, meningococcus Week ended— June 10, 1944	Meningitis, meningococcus Week ended— June 12, 1943	Meningitis, meningococcus Median 1939–43
NEW ENGLAND												
Maine	0	0	0	------	2	------	139	191	147	1	5	1
New Hampshire	0	0	0	------	------	------	3	36	10	0	2	0
Vermont	0	0	0	------	------	------	14	293	105	0	0	0
Massachusetts	1	2	3	------	------	------	877	1,532	1,120	13	19	2
Rhode Island	0	0	0	16	------	------	6	81	106	2	6	0
Connecticut	1	2	0	------	------	1	425	342	342	1	8	0
MIDDLE ATLANTIC												
New York	6	8	17	(1)	2	7	1,053	3,784	1,856	36	63	5
New Jersey	5	4	6	1	7	3	713	2,172	1,256	10	23	1
Pennsylvania	10	15	14	4	------	------	411	1,007	715	26	27	6
EAST NORTH CENTRAL												
Ohio	2	7	8	2	2	7	162	315	315	36	15	1
Indiana	5	3	4	1	1	3	51	372	73	4	5	1
Illinois	1	23	23	9	5	11	345	1,432	222	19	19	1
Michigan [2]	6	5	4	------	1	1	447	3,352	832	21	28	1
Wisconsin	3	1	1	6	13	20	1,431	2,497	1,219	9	3	0
WEST NORTH CENTRAL												
Minnesota	2	1	1	------	1	1	324	377	166	3	3	0
Iowa	2	5	3	------	------	------	105	97	167	0	0	0
Missouri	0	0	1	------	------	------	62	185	185	9	14	0
North Dakota	3	0	0	------	2	2	21	51	19	0	1	0
South Dakota	3	0	1	------	------	------	5	79	14	0	0	0
Nebraska	2	2	1	------	1	1	29	158	89	0	2	0
Kansas	3	2	2	------	------	2	133	287	287	3	7	0
SOUTH ATLANTIC												
Delaware	0	0	0	------	------	------	10	30	20	1	0	0
Maryland [2]	6	6	1	1	1	2	204	226	225	8	13	4
District of Columbia	1	0	0	------	1	------	60	89	89	2	7	1
Virginia	3	1	6	43	60	86	280	219	336	3	5	1
West Virginia	1	3	6	7	1	4	250	33	26	2	6	1
North Carolina	4	4	5	8	2	2	327	167	262	3	6	0
South Carolina	3	8	3	109	79	89	188	77	60	1	4	1
Georgia	3	1	3	------	17	17	37	97	97	2	4	0
Florida	2	0	5	1	4	4	111	18	71	7	3	0
EAST SOUTH CENTRAL												
Kentucky	1	2	4	------	2	3	42	63	63	9	1	1
Tennessee	2	7	3	10	11	16	72	103	103	10	10	1
Alabama	2	2	3	9	35	18	71	110	80	0	1	2
Mississippi [2]	4	2	3	------	------	------	------	------	------	0	3	0
WEST SOUTH CENTRAL												
Arkansas	4	7	4	12	6	11	163	55	55	1	0	0
Louisiana	8	1	3	4	------	2	21	17	18	6	0	1
Oklahoma	0	4	4	47	9	10	180	13	38	3	0	0
Texas	22	29	20	287	298	153	1,172	228	437	20	9	2
MOUNTAIN												
Montana	0	0	0	4	4	1	43	110	110	0	3	0
Idaho	0	0	0	2	------	------	11	29	29	0	9	0
Wyoming	0	0	0	------	19	1	48	41	15	0	3	0
Colorado	8	13	8	12	56	18	103	151	151	2	2	0
New Mexico	1	0	0	------	6	2	58	3	12	0	1	0
Arizona	0	2	2	33	58	45	112	9	39	1	2	0
Utah [2]	0	0	0	1	------	------	71	112	112	1	3	0
Nevada	0	0	0	------	------	------	4	17	13	0	1	0
PACIFIC												
Washington	1	9	3	2	7	1	223	361	361	2	8	1
Oregon	0	2	1	3	10	9	111	105	72	0	6	2
California	23	17	16	42	42	49	3,384	1,163	1,163	28	22	2
Total	154	200	200	676	765	765	14,112	22,286	14,662	314	382	32
23 weeks	5,075	5,671	6,016	333,967	75,514	147,990	551,741	466,940	423,156	11,197	11,104	1,094

See footnotes at end of table.

Telegraphic morbidity reports from State health officers for the week ended June 10, 1944, and comparison with corresponding week of 1943 and 5-year median—Con.

Division and State	Poliomyelitis			Scarlet fever			Smallpox			Typhoid and paratyphoid fever [3]		
	Week ended—		Median 1939–43	Week ended—		Median 1939–43	Week ended—		Median 1939–43	Week ended—		Median 1939–43
	June 10, 1944	June 12, 1943		June 10, 1944	June 12, 1943		June 10, 1944	June 12, 1943		June 10, 1944	June 12, 1943	
NEW ENGLAND												
Maine	0	0	0	40	13	3	0	0	0	0	0	0
New Hampshire	0	1	0	3	9	1	0	0	0	0	0	0
Vermont	0	0	0	2	9	5	0	0	0	0	0	0
Massachusetts	0	0	0	251	360	166	0	0	0	3	4	4
Rhode Island	0	1	0	8	24	6	0	0	0	0	0	0
Connecticut	0	1	1	43	64	35	0	0	0	1	3	2
MIDDLE ATLANTIC												
New York	4	5	3	304	344	344	0	0	0	6	7	7
New Jersey	0	0	0	141	52	102	0	1	0	0	3	2
Pennsylvania	0	0	0	219	130	256	0	0	0	6	5	7
EAST NORTH CENTRAL												
Ohio	2	1	0	274	134	196	0	3	1	3	4	5
Indiana	0	1	0	59	54	42	0	1	1	0	5	1
Illinois	2	1	2	146	108	180	0	0	4	6	1	3
Michigan [2]	0	0	0	215	66	178	0	0	2	5	2	3
Wisconsin	0	0	0	151	237	93	1	0	1	1	1	1
WEST NORTH CENTRAL												
Minnesota	0	0	0	61	38	40	0	0	0	2	0	0
Iowa	0	0	0	127	12	14	0	0	0	1	0	0
Missouri	0	0	0	29	37	37	0	1	1	0	2	2
North Dakota	0	0	0	14	0	4	1	0	0	0	0	1
South Dakota	0	0	0	7	12	8	0	0	2	0	1	0
Nebraska	0	0	0	19	17	8	0	0	1	0	0	0
Kansas	0	0	0	34	24	27	0	0	0	1	2	1
SOUTH ATLANTIC												
Delaware	0	0	0	4	3	3	0	0	0	0	0	0
Maryland [2]	0	0	0	83	34	34	0	0	0	1	3	3
District of Columbia	0	0	0	32	6	6	0	0	0	1	0	0
Virginia	0	0	0	32	20	19	0	0	0	3	7	5
West Virginia	0	0	0	51	10	18	0	0	0	2	3	3
North Carolina	1	0	0	15	7	16	0	0	0	0	0	3
South Carolina	0	0	1	4	4	3	0	0	0	1	1	2
Georgia	1	0	0	9	11	5	0	0	0	2	15	13
Florida	1	0	1	3	0	1	0	0	0	2	7	5
EAST SOUTH CENTRAL												
Kentucky	5	2	1	23	10	35	1	0	0	5	4	4
Tennessee	1	0	0	28	10	26	0	0	2	6	3	3
Alabama	0	2	1	8	11	8	0	0	0	1	0	2
Mississippi [2]	3	0	0	6	3	3	0	0	0	0	2	2
WEST SOUTH CENTRAL												
Arkansas	0	1	0	2	5	2	0	1	1	5	7	7
Louisiana	7	0	1	2	2	4	0	1	0	4	5	5
Oklahoma	3	0	0	10	13	5	0	0	3	9	1	3
Texas	0	10	1	68	26	21	0	0	1	8	6	13
MOUNTAIN												
Montana	0	0	0	17	8	10	0	0	0	1	0	0
Idaho	0	0	0	25	66	2	0	0	0	2	0	0
Wyoming	0	0	0	25	17	2	0	0	0	0	0	0
Colorado	1	0	0	43	45	21	0	0	0	0	0	1
New Mexico	0	0	0	7	3	3	0	0	0	5	1	1
Arizona	0	3	0	24	11	6	0	0	0	2	0	1
Utah [2]	0	0	0	53	19	7	0	0	0	0	0	0
Nevada	0	1	0	0	1	0	0	0	0	0	0	0
PACIFIC												
Washington	1	3	0	129	20	20	0	0	0	1	0	0
Oregon	0	0	0	45	12	11	0	1	1	0	1	1
California	9	27	5	270	173	111	0	0	0	8	3	3
Total	41	60	54	3,165	2,294	2,294	3	9	42	104	109	124
23 weeks	588	659	556	135,274	87,636	87,636	251	553	1,037	1,792	1,425	1,947

See footnotes at end of table.

Telegraphic morbidity reports from State health officers for the week ended June 10, 1944, and comparison with corresponding week of 1943 and 5-year median—Con.

Division and State	Whooping cough			Week ended June 10, 1944								
	Week ended—		Median 1939–43	Anthrax	Dysentery			Encephalitis, infectious	Leprosy	Rocky Mt. spotted fever	Tularemia	Typhus fever
	June 10, 1944	June 12, 1943			Amebic	Bacillary	Unspecified					
NEW ENGLAND												
Maine	1	32	24	0	0	0	0	0	0	0	0	0
New Hampshire	0	15	6	0	0	0	0	0	0	0	0	0
Vermont	7	7	34	0	0	0	0	0	0	0	0	0
Massachusetts	56	132	162	0	0	0	0	1	0	0	0	0
Rhode Island	11	37	32	0	0	0	0	0	0	0	0	0
Connecticut	53	24	58	0	0	0	0	1	0	0	0	0
MIDDLE ATLANTIC												
New York	155	241	359	0	0	2	0	1	0	1	0	0
New Jersey	61	167	167	0	0	0	0	0	0	1	0	0
Pennsylvania	66	237	302	0	0	0	0	0	0	0	0	0
EAST NORTH CENTRAL												
Ohio	72	128	145	0	0	0	0	2	0	0	0	0
Indiana	16	57	50	0	0	0	0	0	0	0	0	0
Illinois	34	132	132	0	0	0	0	0	0	0	0	0
Michigan [2]	81	219	218	0	2	0	0	0	0	0	0	0
Wisconsin	48	246	125	0	0	0	0	0	0	0	0	0
WEST NORTH CENTRAL												
Minnesota	22	51	34	0	3	0	0	0	0	0	0	0
Iowa	4	23	26	0	0	0	0	0	0	0	0	0
Missouri	19	34	20	0	0	0	2	0	0	0	0	0
North Dakota	3	11	15	0	0	0	0	0	0	0	0	0
South Dakota	6	0	3	0	0	0	0	0	0	0	0	0
Nebraska	2	9	16	0	0	0	0	0	0	0	0	0
Kansas	30	75	55	0	0	0	0	0	0	0	0	0
SOUTH ATLANTIC												
Delaware		4	4	0	0	0	0	0	0	1	0	0
Maryland [2]	45	121	108	0	0	0	0	0	0	2	0	0
District of Columbia	1	41	24	0	0	0	0	0	0	0	0	0
Virginia	35	135	59	0	0	0	206	0	0	3	6	0
West Virginia	23	129	58	0	0	0	0	0	0	0	0	0
North Carolina	124	250	237	0	1	0	0	0	0	0	0	2
South Carolina	79	84	63	0	0	35	0	0	0	0	0	1
Georgia	30	90	25	0	1	27	1	0	0	0	1	20
Florida	19	21	10	0	0	166	0	4	0	0	0	9
EAST SOUTH CENTRAL												
Kentucky	76	55	55	0	0	3	0	0	0	0	0	0
Tennessee	21	69	54	0	0	0	3	1	0	0	1	0
Alabama	14	39	55	0	0	0	0	0	0	0	0	15
Mississippi [2]	0			0	0	0	0	0	0	0	6	4
WEST SOUTH CENTRAL												
Arkansas	26	47	42	0	0	3	0	0	0	0	2	0
Louisiana	3	7	7	0	1	2	0	0	0	0	0	12
Oklahoma	4	26	12	0	0	0	0	0	0	3	0	0
Texas	230	507	294	0	20	482	0	4	0	0	0	39
MOUNTAIN												
Montana	4	20	7	0	0	0	0	0	0	0	0	0
Idaho	9	0	2	0	0	0	0	0	0	1	0	0
Wyoming	9	0	6	0	0	0	0	0	0	4	1	0
Colorado	13	25	29	0	0	1	0	0	0	1	0	0
New Mexico	7	5	20	0	0	3	0	1	0	0	0	0
Arizona	8	23	23	0	1	1	54	0	0	0	0	0
Utah [2]	84	65	65	0	0	0	0	0	0	1	2	0
Nevada	0	2	2	0	0	0	0	0	0	0	0	0
PACIFIC												
Washington	15	60	65	0	0	0	0	0	0	0	0	0
Oregon	14	20	24	0	0	0	0	0	0	0	0	0
California	96	518	431	0	0	13	0	0	1	0	0	0
Total	1,736	4,240	3,778	0	29	738	266	15	1	18	19	102
23 weeks	41,503	93,259	90,631	17	591	6,740	1,909	256	14	90	257	1,100
23 weeks, 1943				31	769	4,890	1,237	258	11	108	415	1,061

[1] New York City only.
[2] Period ended earlier than Saturday.
[3] Including paratyphoid fever cases reported separately, as follows: Massachusetts 3, Illinois 1, Michigan 1, Georgia 1, Florida 1, Kentucky 1, Arkansas 1, Texas 1, California 1.

WEEKLY REPORTS FROM CITIES

City reports for week ended May 27, 1944

This table lists the reports from 90 cities of more than 10,000 population distributed throughout the United States, and represents a cross section of the current urban incidence of the diseases included in the table.

	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
NEW ENGLAND												
Maine:												
Portland	0	0	---	0	54	0	1	0	9	0	0	0
New Hampshire:												
Concord	0	0	-----	0	2	0	0	0	0	0	0	1
Vermont:												
Barre	0	0	---	0	0	0	0	0	1	0	0	0
Massachusetts:												
Boston	2	0	-----	0	168	11	10	0	83	0	0	8
Fall River	0	0	-----	0	33	0	2	0	1	0	0	1
Springfield	0	0	------	0	25	1	0	0	31	0	0	8
Worcester	0	0	-----	0	5	0	9	0	28	0	2	4
Rhode Island:												
Providence	0	0	----	0	5	0	6	0	5	0	0	4
Connecticut:												
Bridgeport	0	0	------	0	11	0	2	1	1	0	0	0
Hartford	0	0	-----	0	8	2	1	0	15	0	1	0
New Haven	0	0	------	0	34	2	0	0	1	0	0	4
MIDDLE ATLANTIC												
New York:												
Buffalo	0	0	-----	-----	4	2	8	------	7	0	0	0
New York	17	2	1	2	359	34	64	3	245	0	0	25
Rochester	0	0	------	0	17	3	4	1	1	0	1	1
Syracuse	0	0	------	0	4	0	3	0	4	0	0	9
New Jersey:												
Camden	1	0	------	0	5	0	1	0	14	0	0	0
Newark	0	0	------	0	146	1	5	0	24	0	0	3
Trenton	0	0	------	0	2	0	0	0	7	0	0	0
Pennsylvania:												
Philadelphia	2	0	1	1	45	9	21	0	87	0	0	11
Pittsburgh	1	0	----	0	4	3	11	0	23	0	0	5
Reading	0	0	-----	0	2	0	1	0	0	0	0	1
EAST NORTH CENTRAL												
Ohio:												
Cincinnati	1	0	------	0	36	4	0	2	44	0	0	8
Cleveland	0	0	2	2	29	7	10	0	117	0	0	8
Columbus	1	0	-----	0	23	1	3	0	3	0	0	17
Indiana:												
Fort Wayne	0	0	------	0	0	1	2	0	0	0	0	0
Indianapolis	3	0	------	0	78	2	5	0	34	0	0	9
South Bend	0	0	-----	0	1	0	0	0	5	0	0	0
Terre Haute	0	0	------	0	2	0	1	0	0	0	1	0
Illinois:												
Chicago	7	0	------	0	142	14	14	0	112	0	0	17
Springfield	0	0	------	0	45	0	1	0	2	0	1	0
Michigan:												
Detroit	2	0	-----	1	136	12	8	0	123	0	0	24
Flint	0	0	------	0	3	0	1	0	6	0	0	2
Grand Rapids	0	0	-----	0	11	0	2	0	12	0	0	1
Wisconsin:												
Kenosha	0	0	------	0	216	0	0	0	1	0	0	9
Milwaukee	0	0	------	0	241	1	4	0	58	0	0	27
Racine	0	0	------	0	92	0	0	0	1	0	0	3
Superior	0	0	------	0	3	0	0	0	9	0	0	0
WEST NORTH CENTRAL												
Minnesota:												
Duluth	0	0	------	0	157	0	1	0	8	0	0	------
Minneapolis	0	0	-----	0	198	1	3	0	38	0	0	4
St. Paul	0	0	-----	0	57	1	2	0	14	0	0	2
Missouri:												
Kansas City	0	0	------	0	62	1	6	0	8	0	0	2
St. Joseph	0	0	------	0	----	0	0	0	2	0	0	0
St. Louis	0	0	1	1	20	7	15	0	15	0	2	9
North Dakota:												
Fargo	0	0	-----	0	1	0	0	0	7	0	0	0
Nebraska:												
Omaha	1	0	----	0	53	0	3	0	11	0	1	0
Kansas:												
Topeka	1	0	------	0	35	0	2	0	0	0	0	0
Wichita	0	0	------	0	14	0	2	0	6	0	0	3

City reports for week ended May 27, 1944—Continued

	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
SOUTH ATLANTIC												
Delaware:												
Wilmington	0	0	--	0	0	0	1	0	2	0	0	0
Maryland:												
Baltimore	8	0	2	2	138	1	6	0	39	0	0	43
Cumberland	0	1	-----	0	0	0	0	0	0	0	0	0
Frederick	0	0	-----	0	0	0	0	0	3	0	0	0
District of Columbia:												
Washington	0	0	-----	0	147	0	7	0	82	0	0	4
Virginia:												
Lynchburg	0	0	-----	0	0	0	0	0	2	0	0	0
Richmond	0	0	-----	0	10	2	1	0	3	0	0	0
Roanoke	1	0	-----	0	4	0	0	0	1	0	0	7
West Virginia:												
Charleston	0	0	-----	0	0	0	0	0	8	0	0	0
Wheeling	0	0	-----	0	0	0	3	0	0	0	0	0
North Carolina:												
Raleigh	0	0	-----	0	66	0	2	0	1	0	0	1
Wilmington	0	0	-----	0	17	0	1	0	0	0	0	8
Winston-Salem	0	0	-----	0	7	0	0	0	1	0	0	1
South Carolina:												
Charleston	0	0	-----	0	0	0	1	0	0	0	0	0
Georgia:												
Atlanta	0	0	5	0	9	0	4	0	15	0	0	0
Brunswick	0	0	-----	0	0	0	0	0	0	0	0	0
Savannah	0	0	-----	0	1	0	1	0	0	0	0	0
Florida:												
Tampa	1	0	3	0	1	1	1	0	1	0	3	0
EAST SOUTH CENTRAL												
Tennessee:												
Memphis	0	0	1	1	10	3	9	0	12	0	0	27
Nashville	0	0	-----	3	14	3	2	0	4	0	0	0
Aalabma:												
Birmingham	0	0	-----	0	7	1	1	0	2	0	0	0
Mobile	0	0	-----	0	2	1	2	0	0	0	0	0
WEST SOUTH CENTRAL												
Arkansas:												
Little Rock	0	0	1	1	7	0	2	0	0	0	0	0
Louisiana:												
New Orleans	0	0	2	0	20	3	6	0	1	0	1	1
Shreveport	0	0	-----	0	0	0	6	1	0	0	0	0
Texas:												
Dallas	0	0	-----	0	66	0	2	0	4	0	0	3
Galveston	0	0	-----	0	2	0	3	0	1	0	1	1
Houston	0	0	-----	0	1	1	4	0	2	0	0	1
San Antonio	1	0	1	2	4	0	2	0	2	0	0	1
MOUNTAIN												
Montana:												
Billings	0	0	-----	0	19	0	1	0	1	0	0	0
Great Falls	0	0	-----	0	5	0	0	0	1	0	0	0
Helena	0	0	-----	0	4	0	0	0	1	0	0	0
Missoula	0	0	-----	0	17	0	0	0	1	0	0	0
Idaho:												
Boise	0	0	-----	0	1	0	0	0	2	0	0	0
Colorado:												
Denver	1	0	2	0	48	2	3	1	14	0	0	11
Pueblo	0	0	-----	0	6	0	2	0	8	0	0	0
Utah:												
Salt Lake City	0	0	-----	0	15	0	2	0	21	0	0	7
PACIFIC												
Washington:												
Seattle	0	0	-----	0	50	1	3	0	23	0	0	2
Spokane	0	0	-----	0	32	0	0	0	11	0	0	0
Tacoma	0	0	-----	0	26	0	0	0	16	0	0	0
California:												
Los Angeles	6	-----	4	0	433	4	1	0	31	0	0	10
Sacramento	1	0	-----	0	75	0	0	0	10	0	1	0
San Francisco	0	0	-----	0	238	1	11	0	18	0	0	1
Total	58	3	26	16	4,090	144	323	9	1,567	0	13	359
Corresponding week, 1943	73	6	66	22	8,638	204	377	7	1,270	1	21	1,172
Average, 1939-43	67	-----	57	17	5,247	-----	313	-----	1,276	5	21	1,208

Dysentery, amebic.—Cases: New York, 2; Philadelphia, 1; Columbus, 2; Detroit, 1.
Dysentery, bacillary.—Cases: Providence, 1; New York, 4; Chicago, 2; Baltimore, 1; Houston, [illegible]
Dysentery, unspecified.—Cases: New Haven, 1; Baltimore, 2; Tampa, 1; San Antonio, 14.
Rocky Mountain spotted fever.—Cases: Indianapolis, 1; Denver, 1.
Typhus fever.—Cases: Fort Wayne, 3; Mobile, 1; San Antonio, 1.
Tularemia.—Cases: Houston, 1.

Rates (annual basis) per 100,000 population, by geographic groups, for the 90 cities in the preceding table (estimated population, 1943, 34,519,500)

	Diphtheria case rates	Encephalitis, infectious, case rates	Influenza		Measles case rates	Meningitis, meningococcus, case rates	Pneumonia death rates	Poliomyelitis case rates	Scarlet fever case rates	Smallpox case rates	Typhoid and paratyphoid fever case rates	Whooping cough case rates
			Case rates	Death rates								
New England	5.2	0.0	0.0	0.0	898	41.6	60.7	2.6	455	0 0	7.8	78
Middle Atlantic	9.5	0.9	0.9	1.4	267	23.6	53.6	1.8	187	0.0	0.5	25
East North Central	8.5	0.0	1.2	1.8	645	25.6	31.1	1.2	321	0.0	1.2	76
West North Central	3.9	0.0	2.0	2.0	1,178	19.7	65.1	0.0	215	0.0	2.0	39
South Atlantic	16.3	1.6	16 3	3.3	653	6.5	45.7	0.0	258	0.0	4.9	104
East South Central	0.0	0.0	5.8	23 3	192	46.6	81.6	0.0	105	0.0	0.0	157
West South Central	2.8	0 0	11 4	8.5	284	11.4	71.0	0.0	28	0.0	5.7	20
Mountain	7.9	0.0	15.8	0.0	911	15.8	63.4	2.8	388	0.0	0.0	143
Pacific	11.5	0.0	6.6	0.0	1,409	9.9	24.7	7.9	180	0.0	1.6	21
Total	8.8	0.5	3 9	2.4	620	21.8	48.9	1.4	237	0.0	1.9	54

PLAGUE INFECTIONS IN QUAY AND UNION COUNTIES, N. MEX.

Plague infection has been reported proved in a pool of 60 fleas from 2 wood rats, *Neotoma albigula*, collected on May 10, 1944, 20 miles east of Tucumcari, on U. S. Highway No. 66, in Quay County, N. Mex., and in a pool of 22 fleas from grasshopper mice, *Onychomys leucogaster*, collected on May 11 at locations 18–23 miles south of Clayton, on Highway No. 18, in Union County, N. Mex.

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—Week ended May 13, 1944.—During the week ended May 13, 1944, cases of certain communicable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox		6	2	160	337	39	21	108	175	848
Diphtheria		6	3	20	1	1	1		1	33
German measles		19		200	235	16	52	20	58	600
Influenza			1		16		7		5	29
Measles		8	9	900	723	380	67	122	33	2,242
Meningitis, meningococcus				1	1				1	3
Mumps	1	21		175	275	17	12	108	38	647
Scarlet fever		24	9	74	275	62	13	95	80	632
Tuberculosis		16		249	85	27	13	21	27	438
Typhoid and paratyphoid fever				12	1	4	1			18
Undulant fever				2	1					3
Whooping cough		27		40	34	2	1	18	22	144

CUBA

Provinces—Notifiable diseases—Correction.—Reports of certain notifiable diseases by Provinces in Cuba as published on page 565 of the PUBLIC HEALTH REPORTS of the issue of April 28, 1944, should be corrected as follows: Tularemia should be undulant fever, Oriente 1, total 1; yaws should be Oriente 5, total 5. It is believed that no cases of tularemia have occurred in Cuba.

FINLAND

Notifiable diseases—March 1944.—During the month of March 1944, cases of certain notifiable diseases were reported in Finland as follows:

Disease	Cases	Disease	Cases
Actinomycosis	1	Paratyphoid fever	191
Cerebrospinal meningitis	27	Pneumonia (all forms)	2,068
Chickenpox	607	Poliomyelitis	12
Conjunctivitis	17	Puerperal fever	35
Diphtheria	1,270	Rheumatic fever	288
Dysentery	6	Scabies	2,421
Gastroenteritis	1,603	Scarlet fever	924
Gonorrhea	516	Syphilis	350
Hepatitis, epidemic	523	Tetanus	1
Influenza	2,482	Typhoid fever	34
Laryngitis	53	Undulant fever	1
Measles	3,962	Vincent's angina	9
Mumps	534	Whooping cough	920

JAMAICA

Notifiable diseases—4 weeks ended May 6, 1944.—During the 4 weeks ended May 6, 1944, cases of certain notifiable diseases were reported in Kingston, Jamaica, and in the island outside of Kingston, as follows:

Disease	Kingston	Other localities	Disease	Kingston	Other localities
Cerebrospinal meningitis		1	Leprosy		2
Chickenpox	10	51	Tuberculosis	40	84
Diphtheria	3	3	Typhoid fever	8	56
Dysentery		2	Typhus fever	10	2
Erysipelas		1			

NEW ZEALAND

Notifiable diseases—4 weeks ended April 22, 1944.—During the 4 weeks ended April 22, 1944, certain notifiable diseases were reported in New Zealand as follows:

Disease	Cases	Deaths	Disease	Cases	Deaths
Actinomycosis	1		Lethargic encephalitis	1	1
Cerebrospinal meningitis	10	2	Poliomyelitis	8	
Diphtheria	87	4	Puerperal fever	8	1
Dysentery (bacillary)	19		Scarlet fever	485	1
Erysipelas	25	1	Trachoma	2	
Food poisoning	2		Tuberculosis (all forms)	120	49
Influenza	2	1	Typhoid fever	7	1
Lead poisoning	1		Undulant fever	4	

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

NOTE.—Except in cases of unusual incidence, only those places are included which had not previously reported any of the above-mentioned diseases, except yellow fever, during the current year. All reports of yellow fever are published currently.

A table showing the accumulated figures for these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.

(Few reports are available from the invaded countries of Europe and other nations in war zones.)

Cholera

India—Calcutta.—During the week ended May 13, 1944, 100 deaths from cholera were reported in Calcutta, India.

Plague

Egypt.—Plague has been reported in Egypt as follows: Ismailiya—week ended May 26, 1944, 34 cases with 20 deaths including 13 cases and 7 deaths in the southern areas; Port Said—week ended May 13, 1944, 2 cases.

French West Africa—Dakar District—Island of Goree.—For the week ended May 6, 1944, 1 case of plague was reported on the Island of Goree, Dakar District, French West Africa.

Indochina.—Plague has been reported in Indochina as follows: April 21–30, 1944, Annam, 1 case, Cochinchina, 3 cases; May 1–10, 1944, Annam, 6 cases.

Madagascar.—For the period March 11–20, 1944, 4 cases of plague were reported in Madagascar.

Smallpox

Cameroon (French).—For the period April 1-20, 1944, 143 cases of smallpox were reported in French Cameroon.

India.—Smallpox has been reported in India as follows: Bombay—week ended April 29, 1944, 78 cases, 25 deaths; week ended May 6, 1944, 74 cases, 27 deaths; Calcutta—week ended May 13, 1944, 267 deaths.

Nigeria.—For the week ended April 29, 1944, 124 cases of smallpox with 21 deaths were reported in Nigeria.

Turkey.—For the month of March 1944, 851 cases of smallpox were reported in Turkey.

Typhus Fever

Iraq.—Typhus fever has been reported in Iraq as follows: Week ended April 22, 1944, 27 cases, 1 death; week ended April 29, 1944, 26 cases, 4 deaths.

Belgium—Namur Province—Tamines.—For the week ended May 6, 1944, 1 case of typhus fever was reported in Tamines, Namur Province, Belgium.

Hungary.—During the week ended May 13, 1944, 158 cases of typhus fever (including 70 cases in Subcarpathia) were reported in Hungary.

Irish Free State—Roscommon County—Castlerea.—For the week ended May 20, 1944, 1 case of typhus fever was reported in Castlerea, Roscommon County, Irish Free State.

Palestine.—For the month of April 1944, 76 cases of typhus fever with 6 deaths were reported in Palestine.

Tunisia.—Typhus fever has been reported in Tunisia as follows: April 11–20, 1944, 30 cases; April 21–30, 1944, 37 cases.

Yellow Fever

Belgian Congo—Stanleyville Province—Bondo.—For the week ended June 3, 1944, 1 death from yellow fever was reported in Bondo, Stanleyville Province, Belgian Congo.

JAMAICA

Notifiable diseases—4 weeks ended May 6, 1944.—During the 4 weeks ended May 6, 1944, cases of certain notifiable diseases were reported in Kingston, Jamaica, and in the island outside of Kingston, as follows:

Disease	Kingston	Other localities	Disease	Kingston	Other localities
Cerebrospinal meningitis		1	Leprosy		2
Chickenpox	10	51	Tuberculosis	40	84
Diphtheria	3	3	Typhoid fever	8	56
Dysentery		2	Typhus fever	10	2
Erysipelas		1			

NEW ZEALAND

Notifiable diseases—4 weeks ended April 22, 1944.—During the 4 weeks ended April 22, 1944, certain notifiable diseases were reported in New Zealand as follows:

Disease	Cases	Deaths	Disease	Cases	Deaths
Actinomycosis	1		Lethargic encephalitis	1	1
Cerebrospinal meningitis	10	2	Poliomyelitis	8	
Diphtheria	87	4	Puerperal fever	8	1
Dysentery (bacillary)	19		Scarlet fever	485	1
Erysipelas	25	1	Trachoma	2	
Food poisoning	2		Tuberculosis (all forms)	120	49
Influenza	2	1	Typhoid fever	7	1
Lead poisoning	1		Undulant fever	4	

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

NOTE.—Except in cases of unusual incidence, only those places are included which had not previously reported any of the above-mentioned diseases, except yellow fever, during the current year. All reports of yellow fever are published currently.

A table showing the accumulated figures for these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.

(Few reports are available from the invaded countries of Europe and other nations in war zones.)

Cholera

India—Calcutta.—During the week ended May 13, 1944, 100 deaths from cholera were reported in Calcutta, India.

Plague

Egypt.—Plague has been reported in Egypt as follows: Ismailiya—week ended May 26, 1944, 34 cases with 20 deaths including 13 cases and 7 deaths in the southern areas; Port Said—week ended May 13, 1944, 2 cases.

French West Africa—Dakar District—Island of Goree.—For the week ended May 6, 1944, 1 case of plague was reported on the Island of Goree, Dakar District, French West Africa.

Indochina.—Plague has been reported in Indochina as follows: April 21–30, 1944, Annam, 1 case, Cochinchina, 3 cases; May 1–10, 1944, Annam, 6 cases.

Madagascar.—For the period March 11–20, 1944, 4 cases of plague were reported in Madagascar.

Smallpox

Cameroon (French).—For the period April 1–20, 1944, 143 cases of smallpox were reported in French Cameroon.

India.—Smallpox has been reported in India as follows: Bombay—week ended April 29, 1944, 78 cases, 25 deaths; week ended May 6, 1944, 74 cases, 27 deaths; Calcutta—week ended May 13, 1944, 267 deaths.

Nigeria.—For the week ended April 29, 1944, 124 cases of smallpox with 21 deaths were reported in Nigeria.

Turkey.—For the month of March 1944, 851 cases of smallpox were reported in Turkey.

Typhus Fever

Iraq.—Typhus fever has been reported in Iraq as follows: Week ended April 22, 1944, 27 cases, 1 death; week ended April 29, 1944, 26 cases, 4 deaths.

Belgium—Namur Province—Tamines.—For the week ended May 6, 1944, 1 case of typhus fever was reported in Tamines, Namur Province, Belgium.

Hungary.—During the week ended May 13, 1944, 158 cases of typhus fever (including 70 cases in Subcarpathia) were reported in Hungary.

Irish Free State—Roscommon County—Castlerea.—For the week ended May 20, 1944, 1 case of typhus fever was reported in Castlerea, Roscommon County, Irish Free State.

Palestine.—For the month of April 1944, 76 cases of typhus fever with 6 deaths were reported in Palestine.

Tunisia.—Typhus fever has been reported in Tunisia as follows: April 11–20, 1944, 30 cases; April 21–30, 1944, 37 cases.

Yellow Fever

Belgian Congo—Stanleyville Province—Bondo.—For the week ended June 3, 1944, 1 death from yellow fever was reported in Bondo, Stanleyville Province, Belgian Congo.

COURT DECISIONS ON PUBLIC HEALTH

Municipality furnishing water supply in private capacity held to be employer subject to statute designed to protect employees from occupational disease.—(Missouri Supreme Court, Division No. 1; *Lockhart* v. *Kansas City*, 175 S.W.2d 814; decided December 6, 1943.) The plaintiff brought an action for damages on account of personal injuries and disease, claimed to have been caused by conditions under which he worked as janitor in the chemical building at the defendant city's water purification plant. It was alleged that substances prepared and used by the defendant caused deleterious and poisonous dust in the building where the plaintiff worked so that such dust was inhaled by him in dangerous quantities and caused permanent incapacitating injuries and disease. In addition to charging common law negligence the plaintiff also charged violation of certain health and safety statutes. The city contended that these statutes had no application to a municipal corporation and whether or not they were so applicable was the question presented for decision to the Supreme Court of Missouri.

This court first pointed out that cities had statutory authority to erect, maintain, and operate waterworks and other specified plants and that it had long been settled that such plants, when operated to supply services to individuals, were operated by a city in its private corporate capacity. With respect to the statutory provisions relied on by the plaintiff, one of the sections involved (section 10211 of the Missouri Revised Statutes) required "every employer of labor in this state" carrying on work which might produce occupational disease to adopt means to prevent same, while another section (10225) provided that "in this article, unless the context otherwise requires, 'employer' includes persons, partnerships, and corporations." The court said that it was apparent that the purpose was to protect the health of persons employed in processes likely to cause occupational diseases by requiring certain safeguards and preventive measures for the protection of the employees. The act was a recognition by the legislature that many chemical processes of modern industry were likely to cause occupational diseases unless such preventive measures were taken and that common law standards of care were inadequate to meet the situation. "Certainly such diseases would be just as harmful, both to the injured individual and the public, regardless of whether caused by conditions existing in a plant operated by a private or a municipal employer." Also, in the court's view, the law was not one to classify employers but one setting up new standards of care for carrying on certain essential industrial and manufacturing processes. The basis of its application was dependent upon the type of process in which the employee was engaged rather than who or what the employer

was. Because of the plain purpose of the law to protect the health of employees engaged in the specified dangerous processes, the appellate court's conclusion was that the act established standards of care for such work to replace inadequate common law standards, that such standards had to be observed by "every employer" carrying on work to which the act applied, and that no employer was excluded from the act who was liable for failure to observe common law standards of care. A municipality engaged in furnishing public utility services in its private corporate capacity was, therefore, held to be subject to the statute.

Certified copy of death certificate as prima facie evidence.—(Georgia Court of Appeals, Division No. 2; *Bituminous Casualty Corporation et al.* v. *Elliott,* 28 S.E.2d 392; decided November 26, 1943; rehearing denied December 14, 1943.) Section 88-1214 of the Georgia code provided that one of the items to be contained on a death certificate was the following: "Certification as to medical attendance on decedent, fact and time of death, time last seen alive, and cause of death, with contributory (secondary) cause or complication, if any, and duration of each, and whether attributed to dangerous or insanitary conditions of employment; signature and address of physician or official making the medical certificate." The said section also provided that "The personal and statistical particulars (items 1 to 13) shall be authenticated by the signature of the informant, who may be any competent person acquainted with the facts," and that "The medical certificate shall be made and signed by the physician, if there was any, last in attendance on the deceased, who shall specify the time in attendance, the time he last saw the deceased alive, and the hour of the day at which the death occurred." Such physician was also required to "further state the cause of the death, so as to show the course of the disease or sequence of causes resulting in the death, giving first the name of the disease causing death (primary cause) and the contributory (secondary) cause, if any, and the duration of each." Section 88-1215 of the code provided for the making of a certificate where the death occurred without medical attendance, while by section 88-1212 a certified copy of the record of a death registered under the provisions of the vital statistics law was made "prima facie evidence in all courts and places of the facts therein stated."

In a proceeding under the State workmen's compensation act, wherein a widow claimed compensation for the death of her husband, it appeared that the physician who signed the death certificate last saw the deceased alive almost 60 days before his death. The death certificate did not purport to be under section 88-1215 but under section 88-1214, and the Georgia Court of Appeals took the view that

the certificate should have been made in accordance with section 88–1215 or by the physician in attendance on the deceased, if there was one. It followed, according to the court, that as a matter of law the certificate introduced was not prima facie evidence of the facts therein stated relative to the primary and secondary causes of the death of the employee.

×

FEDERAL SECURITY AGENCY

UNITED STATES PUBLIC HEALTH SERVICE

THOMAS PARRAN, *Surgeon General*

DIVISION OF PUBLIC HEALTH METHODS

G. ST. J. PERROTT, *Chief of Division*

The PUBLIC HEALTH REPORTS, first published in 1878 under authority of an act of Congress of April 29 of that year, is issued weekly by the United States Public Health Service through the Division of Public Health Methods, pursuant to the following authority of law: United States Code, title 42, sections 7, 30, 93; title 44, section 220.

It contains (1) current information regarding the prevalence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

The PUBLIC HEALTH REPORTS is published primarily for distribution, in accordance with the law, to health officers, members of boards or departments of health, and other persons directly or indirectly engaged in public health work. Articles of special interest are issued as reprints or as supplements, in which forms they are made available for more economical and general distribution.

Requests for and communications regarding the PUBLIC HEALTH REPORTS, reprints, or supplements should be addressed to the Surgeon General, United States Public Health Service, Washington 14, D. C. Subscribers should remit direct to the Superintendent of Documents, Washington, D. C.

Librarians and others should preserve their copies for binding, as the Public Health Service is unable to supply the general demand for bound copies. Indexes will be supplied upon request.

UNITED STATES GOVERNMENT PRINTING OFFICE, WASHINGTON : 1944

For sale by the Superintendent of Documents, Washington 25, D. C.

Price 5 cents. Subscription price $2.50 a year

Public Health Reports

VOLUME 59 JUNE 23, 1944 NUMBER 25

IN THIS ISSUE

Births, Infant and Maternal Mortality, 1942

CONTENTS

Public Health Reports

Vol. 59 • JUNE 23, 1944 • *No. 25*

BIRTHS, INFANT MORTALITY, AND MATERNAL MORTALITY IN THE UNITED STATES—1942 [1]

By J. Yerushalmy, *Principal Statistician, United States Public Health Service*

During the first year of participation in the war more births were registered in the United States than in any other year in its history and the casualties associated with reproduction—maternal deaths, infant deaths, and stillbirths—were at a lower rate than ever before. This record is testimony not only to the vitality of the population but also to the very real progress that has been made in recent years in the field of maternal and infant hygiene.

The birth rate, which fell to an all-time low of 16.6 per 1,000 population in 1933 and has shown a slow but definite upward trend since 1937, increased sharply in 1941 and continued to increase at an accelerated rate, reaching 21.0 in 1942. It is remarkable that, in spite of the known strains on hospital and medical facilities in many parts of the country, there was a considerable increase in the number and proportion of births that occurred in hospitals, and a decrease in the number and percentage of births attended by nonmedical persons. It is probably true that the average length of stay in the hospital was shorter in 1942 than in previous years. However, judging from the favorable maternal and infant mortality and stillbirth rates, it appears that the reduction in the length of stay in hospitals for delivery has not reached the danger point and that there was a judicious selection of cases for early discharge.

Probably the most outstanding feature of the 1942 record is the 18-percent reduction in maternal mortality from the very low rate for 1941. When compared with the rate for 1940 the reduction in the maternal mortality rate amounted to 31 percent. This is equivalent to the saving of the lives of nearly 5,000 mothers in the short space of 2 years and the saving of more than 11,600 lives annually when compared with the maternal mortality rate which was operating at the beginning of the last decade.

---

[1] From the Tuberculosis Control Section, States Relations Division. Grateful acknowledgement is made to Mrs. Dorothy J Liveright for her assistance in assembling the material.

The reduction in infant mortality has also been striking. The decrease from 1941 to 1942 was three times as large as the reduction from 1940 to 1941. If the 1941 infant mortality rate had been operating in 1942 there would have been nearly 14,000 additional infant deaths. Although statistics on stillbirths are not very reliable, because of the known deficiencies in stillbirth registration, it is nevertheless encouraging to note that here, too, the rate is declining and was lower in 1942 than ever before.

Whether this favorable record of births and maternal and infant mortality extended into the second year of the war cannot be determined with absolute certainty at this time. However, the preliminary figures reported to the Public Health Service from State health departments for the first 6 months of 1943 (*1*) indicate that the birth rate continued to increase and that the downward trend of maternal and infant mortality has at least not been reversed, and may have been extended through 1943. It is important, however, to note that this discussion refers to the rates for the entire country. It therefore does not necessarily reflect satisfactory conditions in all geographic and political subdivisions of the country, such as individual States, cities, and counties.

A summary of the statistics on births and maternal and infant mortality for 1942, issued recently by the Division of Vital Statistics of the Bureau of the Census (*2*), is presented here.

BIRTHS

The number of live births registered in 1942 was 2,808,996 and the birth rate was 21.0 per 1,000 estimated population. This rate nearly equaled that for 1925 and was higher than the rate for any year since then. The percentage increase over 1941 was 11.8 in the number of births and 11.1 in the birth rate.

The increase in the number of births was shared by women of all ages, but not to the same degree. The largest percentage increase occurred among births to mothers aged 20 to 29 years (14.3). When the births are compared by age of father it is also observed that increases were recorded in all age groups. However, the percentage increase was highest among the younger and lowest for births to the older fathers.

There was a 1.4-percent increase among births in which the age of the mother was not stated, with a similar percentage increase for births in which the age of the father was not stated. This latter fact may indicate that there has not been a large increase in illegitimate births, since the majority of these would fall into the group in which the age of the father is not stated.

The increase in the number of births was greater for first births (18 percent) than for subsequent births (8 percent).

The percentage increase in the number of births was higher among ruban residents (18.1) than among residents in the rural districts (3.9). It was particularly high among residents of cities of 100,000 or more population (20.1). Nearly 3 out of every 5 (58.3 percent) births in 1942 were to residents of urban areas. Of the infants whose births were registered, 2,486,934 (88.5 percent) were white, 307,777 (11 percent) were Negro, and 14,285 (0.5 percent) were of other races. The percentage increase in the number of births was higher for whites (12.8) than for nonwhites (4.4).

Physicians attended 92.6 percent of all births, compared with 91.4 percent in 1941. There were, however, 208,242 (7.4 percent) births that were attended by midwives and other nonmedical persons. The proportion of births among nonwhites not attended by medical persons was very high (45 percent), whereas in only 2.5 percent of the white infants was this the case. There was no medical attendant at 14.2 percent of the births to residents of rural areas, compared with 2.6 percent among urban residents.

More than 2 out of every 3 (67.9 percent) live births in the United States in 1942 occurred in hospitals, compared with 61.2 percent in 1941, and 55.8 percent in 1940. Here again the proportion hospitalized was much higher among residents of cities (84 percent) than among rural residents (45 percent), and for white infants (73 percent) than for Negro infants (31 percent).

The proportion of births in hospitals has increased considerably during the period of record. In 1935 (the first year for which information on attendance at birth was issued by the Bureau of the Census), 37 percent of the live births occurred in hospitals, compared with 67.9 percent in 1942. Births attended by physicians in homes dropped from 51 percent in 1935 to 24.7 percent in 1942. There was a decrease in the proportion of births attended by nonmedical persons from 12 percent in 1935 to 7.4 percent in 1942.

The relatively large movement of population which accompanied the extensive industrial war activities during 1942 makes it difficult to determine changes in the birth rate in each State. However, the percentage change in the number of births for each State in itself assumes greater significance, since it reflects, in a sense, the probable shift in the population. Furthermore, for the purpose of determining the health problems of mothers and infants, the main interest rests with the increase in the number of births. For this reason neither the birth rates for 1942 nor the changes in the birth rate are presented here for each State. Instead table 1 presents the number of births in 1942 for each State and percentage changes in the number of births from 1941 and from 1940.

TABLE 1.—*Number of live births in 1940–42 and percentage increase or decrease in the number of live births, 1942 compared with 1941 and 1940, for each State by place of residence*

State	Number of live births			Percentage increase or decrease 1942 compared with—	
	1942	1941	1940	1941	1940
United States	2,808,996	2,513,427	2,360,399	11.8	19.0
Alabama	71,136	64,379	62,938	10.5	13.0
Arizona	12,664	11,425	11,503	10.8	10.1
Arkansas	42,680	40,549	38,473	5.3	10.9
California	154,567	125,190	112,287	23.5	37.7
Colorado	23,566	21,393	21,034	10.2	12.0
Connecticut	37,264	29,036	25,548	28.3	45.9
Delaware	5,657	5,087	4,551	11.2	24.3
District of Columbia	15,179	12,892	11,228	17.7	35.2
Florida	40,901	37,542	33,799	8.9	21.0
Georgia	72,491	67,870	64,757	6.8	11.9
Idaho	11,454	11,658	11,789	−1.7	−2.8
Illinois	156,232	136,159	124,615	14.7	25.4
Indiana	73,706	65,594	61,660	12.4	19.5
Iowa	48,454	46,115	44,854	5.1	8.0
Kansas	33,920	30,417	28,885	11.5	17.4
Kentucky	66,267	63,502	63,768	4.4	3.9
Louisiana	58,093	54,618	50,848	6.4	14.2
Maine	17,719	15,988	15,222	10.8	16.4
Maryland	44,237	37,065	32,365	19.3	36.7
Massachusetts	82,773	69,546	65,551	19.0	26.3
Michigan	123,886	107,458	99,021	15.3	25.1
Minnesota	58,770	54,359	52,915	8.1	11.1
Mississippi	56,667	54,713	52,732	3.6	7.5
Missouri	70,711	65,218	61,479	8.4	15.0
Montana	11,735	11,545	11,556	1.6	1.5
Nebraska	23,676	21,963	22,029	7.8	7.5
Nevada	2,782	2,200	2,109	26.5	31.9
New Hampshire	9,173	8,582	8,329	6.9	10.1
New Jersey	81,709	67,197	59,814	21.6	36.6
New Mexico	14,129	14,738	14,792	−4.1	−4.5
New York	244,802	210,303	196,088	16.4	24.8
North Carolina	89,854	84,595	80,455	6.2	11.7
North Dakota	13,357	13,259	13,135	.7	1.7
Ohio	144,327	125,950	114,663	14.6	25.9
Oklahoma	46,008	45,818	44,887	.4	2.5
Oregon	22,518	18,868	17,628	19.3	27.8
Pennsylvania	197,177	174,193	165,456	13.2	19.2
Rhode Island	14,182	11,611	10,830	22.1	31.0
South Carolina	48,835	47,383	44,612	3.1	9.5
South Dakota	12,424	12,159	12,054	2.2	3.1
Tennessee	65,147	59,855	55,242	8.8	17.9
Texas	144,742	136,782	127,072	5.8	13.9
Utah	15,822	13,538	13,347	16.9	18.5
Vermont	7,175	6,965	6,942	3.0	3.4
Virginia	67,950	61,079	57,014	11.2	19.2
Washington	39,007	30,580	28,159	27.6	38.5
West Virginia	43,922	43,963	42,289	−.1	3.9
Wisconsin	63,962	57,186	54,891	11.9	16.6
Wyoming	5,567	5,322	5,189	4.6	7.3

It may be seen that the increase in the number of births was widespread and occurred in almost every State in the Union. There were only 3 States in which the number of births in 1942 was less than in 1941, and these decreases were slight and insignificant. The largest percentage increase from 1941 occurred in Connecticut and in the State of Washington. When the States are divided into 4 groups according to percentage increase in number of births from 1940 to

1942, it is found that in the lowest quarter of the States the increases were 7.5 percent or less. In the second quarter of the States the percentage increase ranged from 7.6 to 14.9. In the third 12 States the number of births increased from 15 to 24.9 percent, and in the highest quarter of the States and in the District of Columbia, the increase was 25 percent or higher.

The geographic distributions of the States according to this classification is quite distinct, as shown in figure 1. The States with the highest percentage increase in the number of births are found on the Pacific coast, Middle Atlantic States, and the Great Lakes region. These, it should be noted, are also the States in which the greatest

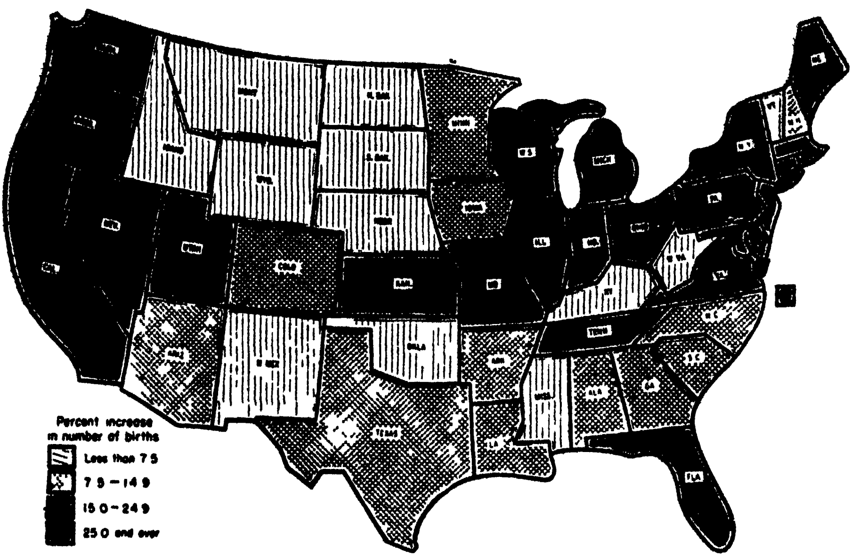


FIGURE 1.—Percentage increase in the number of live births in 1942 over 1941 in each State.

increase in industrial war activities has taken place. The South falls into the second quarter, and the Middle West is the region in which the least increase in the number of births occurred. When the States are subdivided into three groups according, roughly, to their industrial war activity—maximum, medium and negligible[2]—it is found that in the first group there was a 25.4-percent increase in the number of births from 1940 to 1942. In the group of States with medium industrial war activities, there was a 13.7-percent increase, while in the third group the increase amounted to only 5.7 percent. It is thus indicated that a relatively large proportion of the parents of infants born in States heavily engaged in war activities were newcomers to the States.

[2] Classification of the States in these groups follows the one given by T. J. Woofter, Jr., Preliminary population estimates based on ration book applications. J. Am. Statist. Assoc., 37: 437-440 (December 1942).

INFANT MORTALITY

The number of infant deaths in 1942 was 113,492. The infant mortality rate for the year was 40.4 per 1,000 live births compared with 45.3 in 1941 and 47.0 in 1940. The 1942 rate was 10.8 percent lower than that for 1941 and established an all-time low record. There were 79,174 stillbirths reported in 1942. This represents a stillbirth rate of 28.2 per 1,000 live births compared with 29.9 in 1941 and 31.3 in 1940.

The infant mortality rate was considerably lower for white infants than for those of other races. The rate was 37 for white, 64 for Negro, and 74 for infants of other races. The stillbirth rate was also lower for white (26) than for Negro infants (50).

Table 2 presents infant mortality rates for each State for 1942, 1941, and 1940.[3] It will be seen that some of the States attained infant mortality rates which were considerably lower than that for the country as a whole. Connecticut set an all-time new low State record with the rate of 29.2. Minnesota and Oregon were next with rates of 29.6 and 30.5 respectively. At the other end of the scale are New Mexico (97.9) and Arizona (80.1). The rates in these 2 States were considerably higher than those of the next highest, which were registered in South Carolina (58.7) and Nevada (57.2).

TABLE 2.—*Infant mortality rates*[1] *in each State, 1940–42*[2]

State	1942	1941	1940
United States	40.4	45.8	47.0
Alabama	50.1	59.5	61.4
Arizona	60.1	88.3	84.8
Arkansas	39.7	44.0	45.7
California	34.8	36.7	39 4
Colorado	49.7	52.2	59.8
Connecticut	29.2	31.1	34 1
Delaware	47.0	43.0	48.9
District of Columbia	50.8	50.8	47.0
Florida	47.7	52.8	53.6
Georgia	49.3	58 2	57.9
Idaho	36 2	34 5	42.8
Illinois	33.1	34.0	35.8
Indiana	36.6	39 8	41.9
Iowa	33.5	36.5	36.7
Kansas	35.5	37.8	38.1
Kentucky	48.4	58.6	52.8
Louisiana	48.2	57.8	64.2
Maine	46.1	51.2	58 5
Maryland	43.9	52.6	49.6
Massachusetts	32.0	35.3	37.5
Michigan	37.2	38.7	40.7
Minnesota	29.6	34.5	33.3
Mississippi	47.3	54.7	54.3
Missouri	39.0	46.5	46.9
Montana	33.7	37.2	46 2
Nebraska	33.4	34 4	35.7
Nevada	57.2	42.2	51 9
New Hampshire	35.9	36.5	40 0
New Jersey	31.1	36.2	35.6
New Mexico	97.9	95 4	99 6
New York	31.9	33 1	37 2
North Carolina	48 3	59 8	57.4
North Dakota	36.5	37 8	45.1
Ohio	37 0	40.8	41.4
Oklahoma	41.4	47.5	49.7
Oregon	30 5	30.7	32.9
Pennsylvania	38.2	40.7	44.7
Rhode Island	39.5	35.8	38.2
South Carolina	58.7	75.0	68.1
South Dakota	38.2	40.9	39.2
Tennessee	46.4	55.3	54.7
Texas	53.6	56.9	68.6
Utah	33.0	29.9	40.6
Vermont	41.7	43.9	45.0
Virginia	52.5	66.9	59.3
Washington	33.1	35.0	35.7
West Virginia	53.0	61.1	53.9
Wisconsin	32.0	35.1	37.2
Wyoming	45.1	43.8	46.3

[1] Deaths under 1 year per 1,000 live births.
[2] 1942 rates are on a "residence" basis, 1940 and 1941 are on a "place of occurrence" basis.

[3] The 1942 rates are on a "residence" basis, while those for the latter 2 years are on a "place of occurrence" basis. For States the difference between "recorded" and "residence" figures is slight.

Figure 2 presents graphically the infant mortality rate for each State in 1942. It may be seen that the lowest rates prevailed on the Pacific coast and in the Great Lakes region. The rates in the Middle Atlantic States and the Central States were also relatively low, the highest being recorded in the Southwest and South. These high rates in the South are due in great part to the relatively large numbers of Negro births in these States.

In 41 States the infant mortality rates were lower in 1942 than in 1941, 1 State remained unchanged, and in 7 States the rates were higher. However, in most of these latter States the increase was

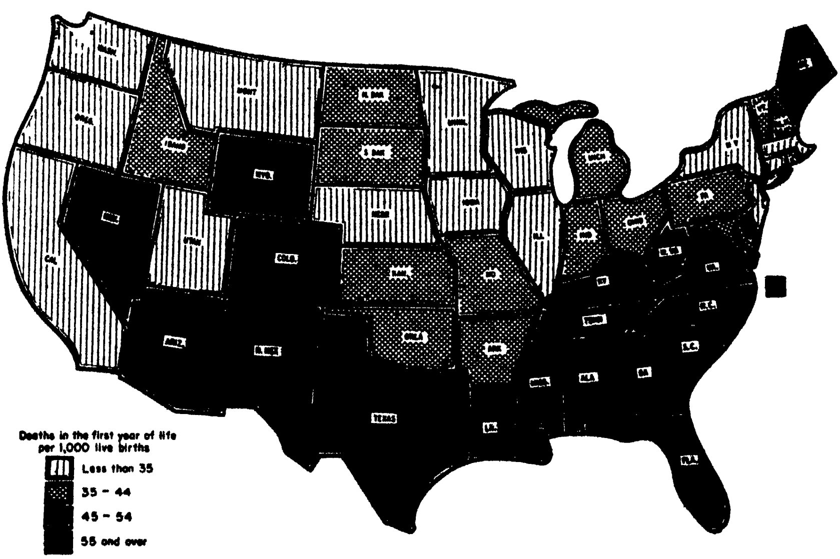


FIGURE 2.—Infant mortality rate in each State, United States, 1942.

slight. Fourteen States had rates of less than 35 per 1,000 live births in 1942 compared with 8 such States in 1941. Fifteen States had rates of 35 to 44, 16 States had rates of 45 to 54, and 4 States had rates of 55 or more. In 1941 there were 12 States in the latter category.

It is worthy of note that the greatest relative reductions occurred in the Southern States. Of the 10 States in which the reduction in infant mortality rate was more than 15 percent, all but 1 were below the Mason-Dixon line.

The trend of the infant mortality rate from 1930 to 1942 is shown in figure 3 for whites and for Negroes. It will be noted that there was a continual decrease in the infant mortality rate during this period. In general, the reduction has been at a more accelerated rate for whites than for Negroes. It is, however, interesting to note that the reduction from 1941 to 1942 has been relatively greater for the latter than for the former. The rate among whites decreased by less than

10 percent in the last year whereas the reduction among Negroes amounted to over 13 percent. The reduction from 1930 was 38 percent for whites and 36 percent for Negroes. The 1942 rate among the latter is still higher than the 1930 rate among whites.

MATERNAL MORTALITY

In 1942 there were 7,267 deaths from causes directly due to pregnancy and childbirth. The maternal mortality rate for the year was 25.9 per 10,000 live births. This rate is 18 percent lower than that for 1941 (31.7) and 62 percent lower than the rate for 1930 (67.3). The reduction in the maternal mortality rate was widespread and occurred in almost every State in the Union. In 43 States and in the District of Columbia the maternal mortality rate was lower in 1942 than in 1941. The increase in the remaining 5 States was not significant. Sixteen States had rates of less than 20. In 1941 there were

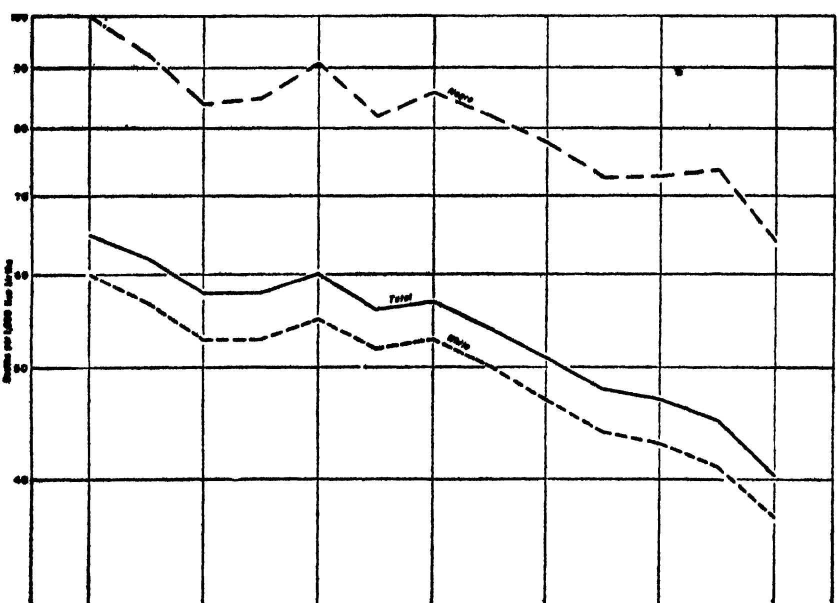


FIGURE 3.—Infant mortality rates by race, United States Birth Registration Area, 1930–42. (Since 1933 all States have been included in the Birth Registration Area; in 1930 all but 2 States were included.)

5 and in 1940 only 1 such State. Nineteen States had rates of 20 to 29, 9 States 30 to 39, and in only 5 States was the rate 40 or over. In 1941 there were 9 States in the highest category, while in 1940 the rate was 40 or over in 18 States.

Nevada established a new low rate for maternal mortality in any State with 7.2 per 10,000 live births; however, since this rate is based on a relatively small number of births it is subject to considerable

fluctuation. The rate for New Hampshire (12.0) was also lower than for any State in previous years. Other low rates were attained by Delaware, Minnesota, and Oregon. The highest rate (53.2) was recorded for South Carolina. Other States with high rates were New Mexico (48.1), Mississippi (43.9), Georgia (41.4), and Florida (40.6).

TABLE 3.—*Maternal mortality rates [1] in each State, 1940–42 [2]*

State (number of deaths in 1942)	1942	1941	1940
United States (7,267)	25.9	31.7	37.6
Alabama (255)	33.0	52.5	61.3
Arizona (49)	38.7	30.0	50.2
Arkansas (158)	37.0	40.3	48.7
California (306)	19.8	22.7	27.9
Colorado (44)	18.7	33.2	40.7
Connecticut (67)	18.0	19.6	28.2
Delaware (9)	15.9	23.4	54.4
District of Columbia (41)	27.0	27.3	29.4
Florida (166)	40.6	63.4	64.8
Georgia (300)	41.4	47.8	56.9
Idaho (30)	26.2	27.3	35.9
Illinois (326)	20.9	24.8	29.7
Indiana (178)	24.2	25.4	28.7
Iowa (94)	19.4	27.3	35.0
Kansas (88)	25.9	28.5	37.3
Kentucky (178)	26.9	37.5	36.0
Louisiana (201)	34.6	43.5	53.4
Maine (38)	21.4	31.5	40.3
Maryland (88)	19.9	24.8	27.8
Massachusetts (174)	21.0	28.5	28.1
Michigan (257)	20.7	27.5	29.2
Minnesota (96)	16.3	19.6	22.2
Mississippi (249)	43.9	56.6	62.8
Missouri (182)	25.7	29.8	36.8
Montana (26)	22.2	15.7	39.5
Nebraska (45)	19.0	23.9	32.0
Nevada (2)	7.2	27.5	48.5
New Hampshire (11)	12.0	26.3	31.8
New Jersey (162)	19.8	27.3	29.9
New Mexico (68)	48.1	45.3	46.8
New York (545)	22.3	23.4	29.7
North Carolina (307)	34.2	39.8	51.6
North Dakota (29)	21.7	23.0	17.2
Ohio (300)	20.8	25.2	32.2
Oklahoma (142)	30.9	30.6	39.7
Oregon (38)	16.9	20.9	25.2
Pennsylvania (530)	26.9	31.0	32.5
Rhode Island (26)	18.3	21.6	25.0
South Carolina (260)	53.2	62.3	67.8
South Dakota (25)	20.1	25.8	34.4
Tennessee (197)	30.2	37.3	47.5
Texas (440)	30.4	36.2	46.0
Utah (27)	17.1	18.9	26.6
Vermont (15)	20.9	22.2	35.9
Virginia (220)	32.4	40.1	44.9
Washington (68)	17.4	18.0	30.6
West Virginia (108)	23.5	29.2	32.3
Wisconsin (114)	17.8	23.1	28.1
Wyoming (13)	23.4	21.2	41.6

[1] Deaths due directly to diseases of pregnancy, childbirth, and the puerperium per 10,000 live births.
[2] 1942 rates are on a "residence" basis, 1941 and 1940 are on a "place of occurrence" basis.

Figure 4 presents graphically the maternal mortality rates in each State. The lowest rates were recorded on the Pacific coast and in the Central States. The New England, Middle Atlantic, and Great Lakes regions were next and the highest rates prevailed in the South and Southwest. Here again the high rates are accounted for in part by the relatively large proportion of Negro births in the Southern States. The maternal mortality rate for Negro women is almost two and one-half times as high as that for white women. It is, however, encouraging to note that in the last few years the reduction in maternal mortality was not limited to white women but was shared by women of all races. The rate for Negro women decreased from 78 in 1940 to 69 in 1941 to 55 in 1942. At the same time the rate for white women declined from 32 in 1940 to 27 in 1941 to 22 in 1942. The trend of the maternal mortality rate for white and Negro women from 1930 to 1942 is shown in figure 5. The decrease was relatively slight up to 1936 but has been accelerated considerably since that year. The 1942 white rate was 64 percent lower than that for 1930 and the Negro rate dropped 53 percent during the same period.

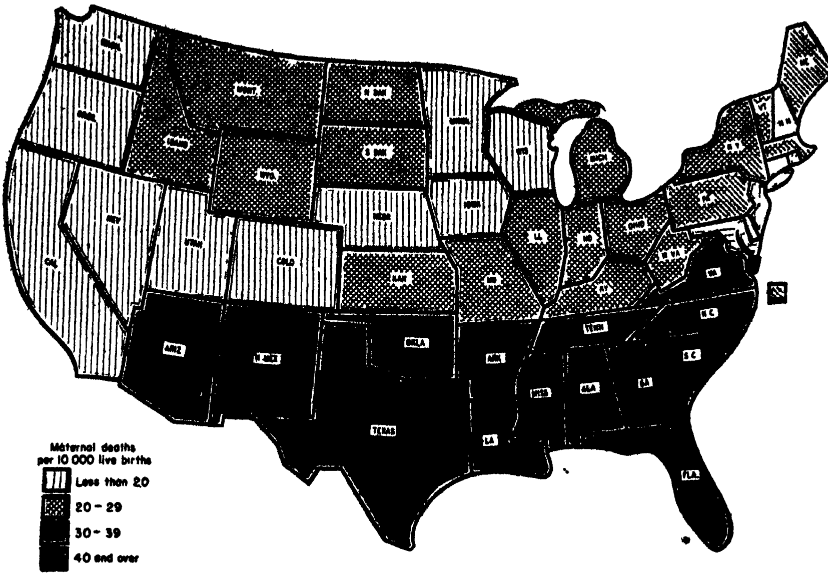


FIGURE 4 —Maternal mortality rate in each State, United States, 1942

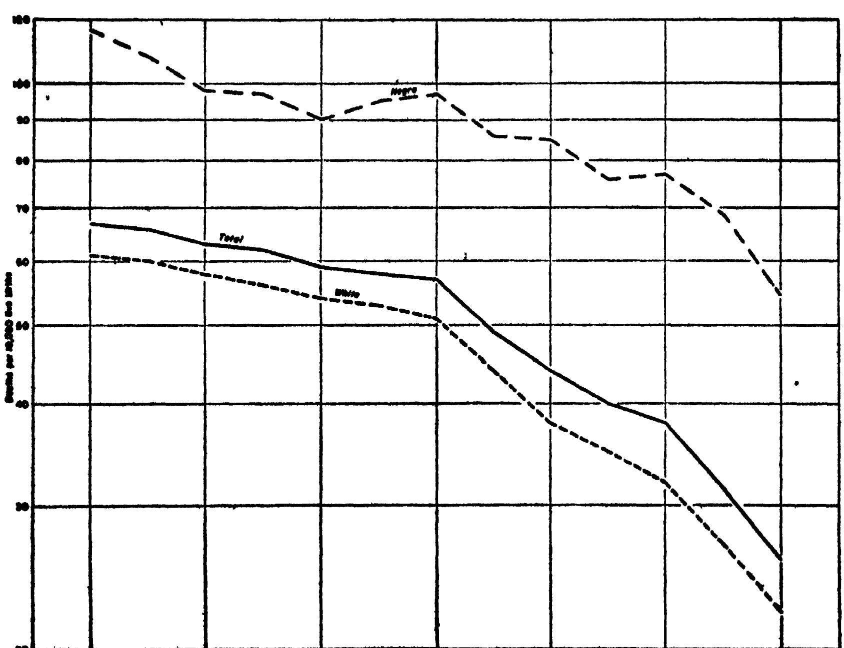


FIGURE 5.—Maternal mortality rates by race, United States Birth Registration Area. (Since 1933 all States have been included in the Birth Registration Area, in 1930 all but 2 States were included.)

Causes of maternal deaths.—The three major causes of maternal deaths—infection, toxemias, and the group comprising hemorrhage, trauma, or shock—were responsible for 90 percent of the 7,267 deaths in 1942. The remaining 765 deaths were due to other and unspecified causes (table 4).

Infection was the leading cause of maternal mortality. It was responsible for 2,618 (36 percent) of the deaths. The death rate from this cause was 9.3 per 10,000 live births. Hemorrhage, trauma, and shock were the cause of 2,018 (28 percent) of the deaths with a death rate of 7.2 per 10,000 live births. Toxemias were responsible for 1,866 (26 percent) of the maternal deaths and the rate from this cause was 6.6 per 10,000 live births.

Both in terms of the percentage of all maternal deaths and in terms of the death rate, the reduction in deaths from infection was larger than for the two other major causes. Infection was responsible for 41 percent of the maternal deaths in 1940 and for 38 percent in 1941, compared with only 36 percent in 1942. In terms of the maternal mortality rate from infection, there was a reduction of 23 percent from the 1941 rate and a 40-percent reduction from the rate in 1940.

A change seems to be taking place in the relative importance of toxemias and the group comprising hemorrhage, trauma, or shock. In 1940 and in previous years, deaths from toxemias were more numerous than those from hemorrhage, trauma, or shock. In 1941 these two major groups of causes were responsible for an equal number of maternal deaths. In 1942 there were more deaths from hemorrhage, trauma, and shock (2,018) than there were from toxemias (1,866). In terms of the death rate per 10,000 live births, toxemias decreased from 9.5 in 1940 to 8.1 in 1941 to 6.6 in 1942. Corresponding figures for hemorrhage, trauma, and shock were 8.7, 8.1, and 7.2.

Physicians failed to give satisfactory information as to the causes of death for 765 (10 percent) of the maternal deaths. For these the physicians stated the causes in general terms which indicated little more than that a child had been born to the mother, or that the woman was pregnant and that this was the most important factor of the death. The lack of specific information as to the cause of death for this considerable number of deaths points the need for improvement in the statement for causes of death on the certificate.

Maternal deaths by time of death in relation to delivery.—Maternal deaths are also tabulated by time of death in relation to delivery in the following four classifications: Deaths associated with abortion, deaths associated with ectopic gestation, deaths before delivery, and deaths during or after childbirth. The last is defined as following a uterine pregnancy of 7 lunar months (28 weeks or more of gestation). For tabulating purposes, the termination of a uterine pregnancy prior to 7 lunar months of gestation is considered an abortion. This

classification makes possible the cross tabulation of the maternal deaths both by cause of death and by time of death in relation to delivery. The data for 1942 are presented in table 4.

TABLE 4.—*Maternal deaths from each cause, and time of death in relation to delivery, United States—1942*

Cause of death [1]	Time of death in relation to delivery				
	Total	Ectopic gestation	During or after abortion	Before delivery	During or after childbirth
	NUMBER				
All causes	7,267	346	1,231	1,110	4,580
Infection	2,618	76	929	...	1,616
Toxemias	1,866	...	79	777	1,010
Eclampsia	969	...	...	384	585
Albuminuria and nephritis	437	...	...	184	253
Other toxemias	460	...	79	209	172
Hemorrhage, trauma, or shock	2,018	270	111	61	1,573
Other and unspecified causes	765	...	112	[2] 272	381
	PERCENT				
All causes	100	100	100	100	100
Infection	36	22	76	...	35
Toxemias	26	...	6	70	22
Eclampsia	14	...	...	35	13
Albuminuria and nephritis	6	...	...	16	5
Other toxemias	6	...	6	19	4
Hemorrhage, trauma, or shock	28	78	9	5	35
Other and unspecified causes	10	...	9	[2] 25	8

[1] The following numbers of the International List of Causes of Death (1938 revision) are included in the three broad groups of causes. Infection—140, 142a, 147, and 150a; toxemias—141a, c, 144, and 148; hemorrhage, trauma, or shock—141b, 142b, 143, 146, and 149; other and unspecified causes—141d, e, f, 145, 150b, c.

[2] 190 of the 272 deaths in this group were classified as "with mention of infection" and should logically be counted under infection. However, in previous years the publications of the Bureau of the Census did not separate this cause as to those with and without mention of infection. It was therefore thought desirable to use the same classification also for 1942 in order not to disturb the comparison with earlier years.

Of the 7,267 maternal deaths, 17 percent (1,231) were reported to have occurred during or after abortion. Nearly 5 percent (346) of the deaths resulted from ectopic gestation, 15 percent (1,110) occurred before delivery, and 63 percent (4,580) occurred during or after childbirth. These percentages are not much different from those of previous years, indicating that the reduction in maternal mortality has occurred in all these groupings. The largest change occurred in abortions which were responsible for 19 percent of the deaths in the 3-year period 1939–41, and for only 17 percent of the deaths in 1942.

From table 4 it is possible to determine, on the one hand, the distribution of the major causes of maternal deaths for the various classifications of time of death in relation to delivery, and on the other hand, the distribution as to time of delivery for each of the major causes of death. For example, 3 out of every 4 deaths associated with abortion were due to infection and a relatively small number of them (6 percent) died from toxemias. Looking at it the other way, more than 60 percent of all deaths due to infection occurred during or after childbirth and nearly 36 percent occurred during or after abortion

In general, the distribution of the maternal deaths according to time of death in relation to delivery was similar for most of the States (table 5). There were, however, a few notable exceptions. For example, the proportion of deaths associated with abortion was relatively high in Kansas (31 percent), California and Virginia (25), Iowa (23), and in the District of Columbia (22). On the other hand, in Delaware, Wisconsin, and Idaho, a relatively high proportion of the deaths occurred during or after childbirth, and a smaller proportion were due to abortion.

TABLE 5.—*Percentage distribution of maternal deaths [1] by time of death in relation to delivery in each State by place of residence—1942*

State (number of deaths in 1942)	Death in relation to delivery			
	Abortion	Ectopic gestation	Before delivery	During or after childbirth
	Percent of total maternal deaths			
United States (7,267)	17	5	15	63
Alabama (235)	13	3	29	55
Arizona (49)	12	0	21	67
Arkansas (158)	13	3	20	64
California (306)	25	5	8	62
Colorado (44)	14	11	20	55
Connecticut (67)	13	6	18	63
Delaware (9)	0	0	22	78
District of Columbia (41)	22	12	20	46
Florida (166)	20	3	15	62
Georgia (300)	16	1	15	68
Idaho (30)	7	3	17	73
Illinois (326)	16	7	7	70
Indiana (178)	15	11	21	53
Iowa (94)	23	5	4	68
Kansas (88)	31	1	14	54
Kentucky (178)	12	2	21	65
Louisiana (201)	16	7	20	57
Maine (38)	13	5	21	61
Maryland (88)	19	4	9	68
Massachusetts (174)	11	6	17	66
Michigan (257)	13	9	9	69
Minnesota (96)	20	5	7	68
Mississippi (249)	16	4	13	67
Missouri (182)	20	6	14	60
Montana (26)	15	8	12	65
Nebraska (45)	15	9	18	58
Nevada (2)	0	50	0	50
New Hampshire (11)	18	9	18	55
New Jersey (162)	15	5	17	63
New Mexico (68)	13	4	12	71
New York (545)	20	5	9	66
North Carolina (307)	13	3	28	56
North Dakota (29)	10	4	24	62
Ohio (300)	20	7	8	65
Oklahoma (142)	17	3	15	65
Oregon (38)	18	5	18	59
Pennsylvania (530)	18	4	7	71
Rhode Island (26)	15	4	15	66
South Carolina (260)	15	5	20	60
South Dakota (25)	16	0	24	60
Tennessee (197)	18	3	20	59
Texas (440)	16	4	25	55
Utah (27)	11	7	19	63
Vermont (15)	13	0	20	67
Virginia (220)	25	2	16	57
Washington (68)	16	4	18	62
West Virginia (108)	13	4	23	60
Wisconsin (114)	11	4	11	74
Wyoming (13)	15	0	23	62

[1] Deaths due directly to diseases of pregnancy, childbirth, and the puerperium.

SUMMARY

More births were registered in the United States in 1942 than in any previous year, and the birth rate (21.0 per 1,000 population) has been higher than for any year since 1925. The increase was widespread and occurred in almost every State in the Union.

Physicians attended the births of 2,600,754 infants (92.6 percent). But 208,242 births (7.4 percent) were attended by midwives and other nonmedical personnel. The proportion of births with no medical attendant decreased from 12 percent in 1935 to 7 percent in 1942.

Two out of every three births in 1942 took place in hospitals. The proportion of live births that occurred in hospitals increased from 37 percent in 1935 to 68 percent in 1942.

The infant mortality rate (40.4 per 1,000 live births) was lower in 1942 than in any previous year. The reduction from the 1941 rate is equivalent to the saving of nearly 14,000 infant lives. Nearly all the States shared in the reduction of the infant mortality rate. Decreases were recorded among nonwhite as well as among white infants.

The maternal mortality rate continued its downward trend and established an all-time low record. The 1942 rate (25.9 per 10,000 live births) was 18 percent lower than that for 1941 and 31 percent below the 1940 rate. This is equivalent to the saving of the lives of 5,000 mothers in the space of 2 years. The reduction was widespread and occurred in nearly every one of the States. For the first time the decrease in maternal mortality has been relatively greater among nonwhites than among whites. Reductions were recorded in all 3 major causes of death—infection, toxemias, and the group hemorrhage, trauma, or shock. However, the relative decrease was greater for infection than for the other causes. In 1942 there were relatively more deaths from hemorrhage, trauma, or shock than from toxemias; in previous years there were more of the latter than the former.

The distribution of the 1942 maternal deaths by time of death in relation to delivery was similar to that of previous years; 5 percent were associated with ectopic gestation, 17 percent with abortion, 15 percent occurred before delivery, and 63 percent occurred during or after childbirth.

REFERENCES

(*1*) Provisional mortality rates for the first half of 1943. Pub. Health Rep., 59: 116–124 (Jan. 28, 1944).
(*2*) U. S. Bureau of the Census: Vital Statistics—Special Reports, 1943–44.

DEATHS DURING WEEK ENDED JUNE 10, 1944

[From the Weekly Mortality Index, issued by the Bureau of the Census, Department of Commerce]

	Week ended June 10, 1944	Corresponding week, 1943
Data for 93 large cities of the United States:		
Total deaths	8,360	9,210
Average for 3 prior years	8,445	
Total deaths, first 23 weeks of year	222,122	226,890
Deaths under 1 year of age	618	634
Average for 3 prior years	573	
Deaths under 1 year of age, first 23 weeks of year	14,396	15,767
Data from industrial insurance companies:		
Policies in force	66,602,953	65,560,784
Number of death claims	11,147	12,012
Death claims per 1,000 policies in force, annual rate	8.8	9.6
Death claims per 1,000 policies, first 23 weeks of year, annual rate	10.7	10.4

PREVALENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED JUNE 17, 1944

Summary

A total of 71 cases of poliomyelitis was reported currently, as compared with 41 last week, 99 for the corresponding week last year, and 42 for the 5-year (1939–43) median. The increase was chiefly in North Carolina, where 18 cases were reported for the week and 40 other cases have been reported during June, mostly in Caldwell, Catawba, and Gaston Counties (the total of 58 cases to date includes delayed reports of 39 cases, according to information received under date of June 21). The largest numbers reported currently in other States were 9 in California and 5 each in Florida and Louisiana. The cumulative total for the year to date is 696 cases, as compared with 758 for the same period last year and a 5-year median of 621.

A total of 246 cases of meningococcus meningitis was reported, as compared with 314 last week, 327 for the corresponding week last year, and a 5-year median of 36. The largest numbers reported were 32 in California, 23 in New York, 19 in Pennsylvania, 15 in Illinois, and 14 in Ohio. The cumulative total since March 4 is 6,370, as compared with 7,671 for the same period last year.

Of 110 cases of typhoid fever reported for the week, as compared with 104 last week and 154 for the 5-year median, 74, or 67 percent of the total, occurred in the South Atlantic and South Central Areas. The largest numbers reported were 9 in South Carolina, 8 in Texas, and 7 each in Georgia and Louisiana. The cumulative total reported to date is 1,902, as compared with 1,542 for the same period last year and a 5-year median of 2,108.

Of 21 cases of Rocky Mountain spotted fever reported, 13 occurred in the South Atlantic area, 3 in the Middle Atlantic, 1 in Tennessee, 1 in Montana, and 3 in Wyoming. For the corresponding week last year a total of 18 cases was reported.

A total of 8,290 deaths was recorded for the week in 93 large cities of the United States, as compared with 8,360 last week, and a 3-year (1941–43) average of 8,049. The total reported for the year to date is 230,412, as compared with 235,373 for the same period last year.

Telegraphic morbidity reports from State health officers for the week ended June 17, 1944, and comparison with corresponding week of 1943 and 5-year median

In these tables a zero indicates a definite report, while leaders imply that, although none was reported, cases may have occurred.

Division and State	Diphtheria			Influenza			Measles			Meningitis, meningococcus		
	Week ended—		Median 1939–43	Week ended—		Median 1939–43	Week ended—		Median 1939–43	Week ended—		Median 1939–43
	June 17, 1944	June 19, 1943		June 17, 1944	June 19, 1943		June 17, 1944	June 19, 1943		June 17, 1944	June 19, 1943	
NEW ENGLAND												
Maine	0	1	1	------	1	1	320	182	155	0	5	0
New Hampshire	0	0	0	------	------	------	10	18	18	0	2	0
Vermont	0	0	0	------	------	------	28	217	171	0	0	0
Massachusetts	1	2	2	------	------	------	686	1,098	1,038	7	31	2
Rhode Island	0	0	0	14	1	------	14	148	130	2	6	0
Connecticut	0	1	0	2	------	------	296	246	246	4	6	1
MIDDLE ATLANTIC												
New York	7	6	14	[2] 3	[1] 1	[1] 1	1,028	2,842	1,511	23	56	4
New Jersey	2	2	2	------	4	4	547	1,992	1,267	11	13	1
Pennsylvania	5	11	11	1	------	------	365	721	496	19	17	4
EAST NORTH CENTRAL												
Ohio	4	2	3	11	13	12	318	407	138	14	14	1
Indiana	2	0	4	4	3	3	35	206	58	5	4	0
Illinois	6	16	19	2	1	5	190	973	223	15	21	2
Michigan [2]	5	1	3	------	1	1	258	3,217	793	11	17	1
Wisconsin	2	1	1	5	13	15	1,136	2,070	1,111	3	1	0
WEST NORTH CENTRAL												
Minnesota	3	0	1	------	1	2	146	295	138	4	3	0
Iowa	3	0	2	------	------	------	64	130	130	0	2	0
Missouri	2	2	2	1	3	1	42	153	67	11	8	0
North Dakota	0	1	1	------	------	------	2	30	17	0	0	0
South Dakota	0	0	0	------	------	------	16	74	28	1	0	0
Nebraska	0	2	1	2	11	------	25	42	42	0	0	0
Kansas	1	3	3	1	3	2	90	165	165	4	4	1
SOUTH ATLANTIC												
Delaware	0	0	0	------	------	------	1	15	12	0	0	0
Maryland [3]	8	3	3	9	1	1	78	187	120	6	11	2
District of Columbia	0	0	0	1	------	------	149	74	74	1	3	0
Virginia	6	4	5	22	31	34	190	152	156	3	13	1
West Virginia	2	0	2	3	------	7	88	32	14	2	0	0
North Carolina [3]	5	7	6	3	------	------	365	190	251	8	7	1
South Carolina	1	16	6	97	133	118	165	74	59	4	4	0
Georgia	4	3	3	2	4	9	26	132	60	0	6	1
Florida	3	1	2	3	8	4	56	24	47	8	3	1
EAST SOUTH CENTRAL												
Kentucky	1	3	2	32	3	1	53	56	56	4	8	1
Tennessee	0	4	2	16	9	21	45	79	85	10	3	1
Alabama	0	2	1	4	24	22	45	180	81	5	1	1
Mississippi [3]	1	1	3	------	------	------	------	------	------	0	1	0
WEST SOUTH CENTRAL												
Arkansas	1	6	3	17	6	6	65	46	37	1	1	0
Louisiana	2	2	2	2	6	6	48	19	18	5	1	1
Oklahoma	0	2	2	32	4	13	113	8	45	2	1	0
Texas	28	21	21	263	348	168	739	171	327	8	17	2
MOUNTAIN												
Montana	1	1	1	------	2	1	38	115	70	0	0	0
Idaho	0	0	0	------	------	------	5	31	22	0	1	0
Wyoming	0	0	0	------	20	1	31	41	33	0	0	0
Colorado	6	3	8	3	14	20	87	94	94	2	1	0
New Mexico	2	2	2	1	------	------	44	5	17	0	0	0
Arizona	0	0	1	26	38	38	30	17	38	1	1	0
Utah [2]	0	0	0	------	3	------	41	79	92	0	3	0
Nevada	8	0	0	------	------	------	71	3	3	1	0	0
PACIFIC												
Washington	8	4	2	1	2	------	220	158	187	7	6	0
Oregon	3	0	0	6	9	9	79	85	85	2	2	0
California	25	16	16	15	42	40	2,729	809	809	32	23	3
Total	153	152	173	544	763	641	11,217	18,102	12,480	246	327	36
24 weeks	5,398	5,823	6,198	334,511	78,277	148,631	562,959	485,042	435,636	11,443	11,431	1,130

See footnotes at end of table.

Telegraphic morbidity reports from State health officers for the week ended June 17, 1944, and comparison with corresponding week of 1943 and 5-year median—Con.

Division and State	Poliomyelitis			Scarlet fever			Smallpox			[4] Typhoid and paratyphoid fever		
	Week ended—		Median 1939-43	Week ended—		Median 1939-43	Week ended—		Median 1939-43	Week ended—		Median 1939-43
	June 17, 1944	June 19, 1943		June 17, 1944	June 19, 1943		June 17, 1944	June 19, 1943		June 17, 1944	June 19, 1943	
NEW ENGLAND												
Maine	0	0	0	18	18	8	0	0	0	1	6	1
New Hampshire	0	0	0	8	3	3	0	0	0	0	0	0
Vermont	0	0	0	4	2	3	0	0	0	0	0	0
Massachusetts	0	2	0	254	328	157	0	0	0	2	4	2
Rhode Island	0	1	0	9	19	6	0	0	0	0	0	1
Connecticut	1	0	0	39	53	45	0	0	0	0	0	0
MIDDLE ATLANTIC												
New York	3	2	2	251	288	288	0	0	0	4	10	10
New Jersey	0	1	1	126	56	101	0	0	0	0	5	2
Pennsylvania	1	1	1	204	107	150	0	0	0	2	6	9
EAST NORTH CENTRAL												
Ohio	2	0	0	667	92	142	0	1	2	5	0	4
Indiana	0	0	0	31	12	37	0	2	4	1	2	3
Illinois	0	0	1	190	68	154	0	1	9	0	7	7
Michigan [3]	1	1	1	113	76	191	0	1	1	2	1	1
Wisconsin	0	1	0	110	163	79	0	0	0	0	0	0
WEST NORTH CENTRAL												
Minnesota	1	0	0	62	31	31	0	0	1	1	0	0
Iowa	0	0	0	21	16	26	0	0	10	0	0	1
Missouri	0	1	0	25	25	38	0	0	1	2	5	5
North Dakota	0	0	0	7	1	2	0	1	1	0	0	0
South Dakota	0	0	0	22	8	5	0	0	1	0	0	0
Nebraska	0	0	0	14	6	6	0	0	0	0	0	0
Kansas	1	1	1	33	23	23	0	0	1	2	2	2
SOUTH ATLANTIC												
Delaware	0	0	0	4	3	5	0	0	0	0	0	0
Maryland [3]	0	0	0	76	60	20	0	0	0	1	0	2
District of Columbia	0	0	0	24	10	5	0	0	0	0	1	1
Virginia	4	2	0	12	14	14	0	0	0	5	2	3
West Virginia	0	0	0	17	13	13	0	0	0	3	3	3
North Carolina [5]	[5] 17	0	0	12	9	11	0	0	0	4	1	4
South Carolina	1	0	1	2	1	1	0	0	0	9	5	5
Georgia	0	0	0	13	7	7	0	0	0	7	10	12
Florida	5	0	1	5	1	1	0	0	0	4	1	2
EAST SOUTH CENTRAL												
Kentucky	3	0	0	10	11	21	0	0	0	5	2	2
Tennessee	2	0	0	16	14	21	1	0	1	6	3	3
Alabama	3	0	0	4	7	7	0	0	0	2	6	5
Mississippi	2	0	0	2	2	2	2	0	0	4	1	1
WEST SOUTH CENTRAL												
Arkansas	2	3	0	4	0	3	0	0	0	4	4	7
Louisiana	5	2	1	2	2	5	0	0	0	7	6	11
Oklahoma	1	1	0	6	7	7	0	0	1	5	0	3
Texas	4	29	2	36	21	18	0	1	1	8	15	16
MOUNTAIN												
Montana	0	0	0	10	3	6	5	0	0	0	1	0
Idaho	1	0	0	7	55	2	0	0	0	0	0	0
Wyoming	0	1	0	11	19	5	0	0	0	0	0	0
Colorado	0	0	0	22	42	20	0	0	1	2	1	1
New Mexico	0	0	0	11	1	4	0	0	0	2	1	3
Arizona	2	1	0	11	12	3	0	0	0	3	1	1
Utah [3]	0	1	0	31	18	8	0	0	0	0	0	0
Nevada	0	0	0	1	0	0	0	0	0	0	0	0
PACIFIC												
Washington	0	1	0	81	21	21	0	0	0	0	0	1
Oregon	0	0	0	39	20	9	0	0	0	4	1	1
California	9	47	11	223	129	98	0	0	0	3	4	5
Total	[5] 71	99	42	2,810	1,897	1,897	8	7	28	110	117	154
24 weeks	[5] 696	758	621	138,064	89,533	89,533	259	560	1,062	[5] 1,900	1,542	2,108

See footnotes at end of table.

Telegraphic morbidity reports from State health officers for the week ended June 17, 1944, and comparison with corresponding week of 1943 and 5-year median—Con.

Division and State	Whooping cough: Week ended— June 17, 1944	Whooping cough: Week ended— June 19, 1943	Whooping cough: Median 1939-43	Week ended—: Anthrax	Week ended—: Dysentery: Amebic	Week ended—: Dysentery: Bacillary	Week ended—: Dysentery: Unspecified	Week ended—: Encephalitis, infectious	Week ended—: Leprosy	Week ended—: Rocky Mt. spotted fever	Week ended—: Tularemia	Week ended—: Typhus fever
NEW ENGLAND												
Maine	17	36	22	0	0	0	0	0	0	0	0	0
New Hampshire	0	3	3	0	0	0	0	0	0	0	0	0
Vermont	10	20	20	0	0	0	0	0	0	0	0	0
Massachusetts	63	98	156	1	0	0	0	1	0	0	0	0
Rhode Island	16	33	20	0	0	0	0	0	0	0	0	0
Connecticut	43	44	68	0	0	0	0	0	0	0	0	0
MIDDLE ATLANTIC												
New York	165	224	298	1	5	4	0	1	1	2	0	0
New Jersey	60	169	169	0	0	0	0	0	0	1	0	0
Pennsylvania	63	237	257	0	0	0	0	0	0	0	0	0
EAST NORTH CENTRAL												
Ohio	99	137	300	0	1	0	0	0	0	0	0	0
Indiana	16	71	37	0	1	0	0	0	0	0	0	0
Illinois	33	129	129	0	1	0	0	0	0	0	1	0
Michigan [2]	66	281	237	0	0	1	0	1	0	0	0	0
Wisconsin	52	228	144	0	0	0	0	1	0	0	0	0
WEST NORTH CENTRAL												
Minnesota	14	83	28	0	0	0	0	0	0	0	0	0
Iowa	4	41	28	0	0	0	0	0	0	0	0	0
Missouri	37	40	18	0	0	0	0	0	0	0	0	0
North Dakota	1	1	2	0	0	0	0	0	0	0	0	0
South Dakota	18	3	2	0	0	0	0	0	0	0	0	0
Nebraska	12	22	11	0	0	0	0	0	0	0	0	0
Kansas	26	72	43	0	0	1	0	0	0	0	1	0
SOUTH ATLANTIC												
Delaware	0	2	2	0	0		0	0	0	0	0	0
Maryland [2]	57	147	76	0	0	0	1	0	0	5	0	0
District of Columbia	2	29	17	0	0	0	0	0	0	0	0	0
Virginia	92	159	97	0	0	0	140	0	0	3	2	0
West Virginia	15	95	31	0	0	0	0	0	0	0	0	0
North Carolina [5]	166	388	203	0	1	0	0	0	0	4	0	0
South Carolina	145	140	73	0	0	54	0	0	0	0	0	2
Georgia	12	90	29	0	2	11	0	0	0	1	0	12
Florida	16	26	26	0	3	109	0	0	0	0	0	10
EAST SOUTH CENTRAL												
Kentucky	87	39	39	0	0	0	0	0	0	0	0	0
Tennessee	21	64	59	0	0	0	1	0	0	1	2	1
Alabama	23	82	53	0	0	0	0	0	0	0	0	8
Mississippi [2]	0	------	------	0	0	0	0	0	0	0	2	4
WEST SOUTH CENTRAL												
Arkansas	7	26	26	0	3	8	0	0	0	0	2	0
Louisiana	1	14	9	0	0	30	0	0	0	0	0	3
Oklahoma	36	45	25	0	0	0	0	0	0	0	0	0
Texas	199	497	261	0	11	515	0	2	0	0	1	57
MOUNTAIN												
Montana	18	24	13	0	0	1	0	0	0	1	0	0
Idaho	0	0	5	0	0	0	0	0	0	0	0	0
Wyoming	6	3	3	0	0	0	0	0	0	3	0	0
Colorado	13	18	25	0	0	0	0	0	0	0	0	0
New Mexico	3	10	17	0	0	1	0	0	0	0	0	0
Arizona	4	28	34	0	0	0	71	0	0	0	0	0
Utah [2]	52	91	91	0	0	0	0	0	0	0	0	0
Nevada	0	3	0	0	0	0	0	1	0	0	0	0
PACIFIC												
Washington	19	35	40	0	0	0	0	0	0	0	0	0
Oregon	7	27	27	0	0	0	0	0	0	0	0	0
California	104	292	292	0	3	10	0	2	0	0	0	0
Total	1,915	4,341	3,721	2	31	745	213	9	1	21	11	97
24 weeks	43,418	97,600	94,166	19	622	7,485	2,122	265	13	[5] 110	268	[4] 1,196
24 weeks, 1943	------	------	------	33	809	5,292	1,367	263	12	126	438	1,134

[1] New York City only. [2] Period ended earlier than Saturday.

[3] A total to date of 58 cases in June, chiefly in Catawba, Caldwell and Gaston Counties, including delayed reports of 39 cases, was reported under date of June 21.

[4] Including paratyphoid fever cases reported separately as follows: Massachusetts 2, West Virginia 1, Georgia 1, South Carolina 1, Tennessee 1, Texas 1.

[5] Corrected reports for North Carolina: Week ended May 13—poliomyelitis 0, Rocky Mountain spotted fever 0; week ended May 20—typhoid fever 6, typhus fever 3; week ended May 27—typhoid fever 4.

NOTIFIABLE DISEASES, FIRST QUARTER 1944

The figures in the following table are the totals of the monthly morbidity reports received from the State health authorities for January, February, and March 1944. These reports are preliminary and the figures are therefore more or less incomplete. In most instances they include cases reported in both civilian and military populations. The comparisons made are with similar preliminary reports; but owing to population shifts and the presence of large military populations in certain States, the figures for some States are not comparable with those for prior years, especially for certain diseases. Each State health officer has been requested to include in the monthly report for his State all diseases that are required by law or regulation to be reported in the State. The lists of diseases required to be reported are not the same for each State. Only 12 of the common communicable diseases are notifiable in all the States. In some instances cases are reported in some States of diseases that are not required by law or regulation to be reported, and the figures are included although manifestly incomplete. There are also variations among the States in the degree of completeness of reporting of cases of the reportable diseases. As compared with the deaths, incomplete case reports are obvious for such diseases as malaria, pellagra, pneumonia, and tuberculosis, while in many States other diseases, such as puerperal septicemia and Vincent's infection, are not reportable.

In spite of these known deficiencies, however, these monthly reports, which are published quarterly and annually in consolidated form, have proved of value in presenting early information regarding the reported incidence of a large group of diseases and in indicating a trend by providing a comparison with similar preliminary figures for prior years. To some extent they also give a picture of the geographic prevalence of certain diseases, as the States are arranged by geographic location.

Leaders are used in the table to indicate that no case of the disease was reported.

Consolidated monthly State morbidity reports for January, February, and March 1944

Division and State	Anthrax	Chickenpox	*Diphtheria	Dysentery, amebic	Dysentery, bacillary	Dysentery, undefined	Encephalitis, infectious	German measles	Hookworm disease	Influenza	Malaria	*Measles	*Meningitis, meningococcus	Mumps	Ophthalmia neonatorum	Pellagra	Pneumonia, all forms	*Poliomyelitis
NEW ENGLAND																		
Maine	---	762	10	---	---	---	1	55	---	388	1	2,815	53	53	---	---	488	---
New Hampshire	---	105	---	---	---	---	---	60	---	39	1	60	10	53	---	---	25	---
Vermont	---	797	3		---	---	---	84	---	486	---	1,316	8	518	---	---	9	3
Massachusetts	2	8,632	77	1	54	---	5	647	1	---	137	7,069	223	3,581	64	---	1,425	3
Rhode Island	---	549	7	---	12	---	4	39	---	578	17	5,089	78	81	---	---	166	---
Connecticut	---	3,138	22	1	22	---	6	342	---	854	18	3,620	129	713	---	---	1,351	3
MIDDLE ATLANTIC																		
New York	1	8,806	92	23	157	---	16	[1] 541	---	[1] 73	27	24,279	805	1,509	42	---	9,032	15
New Jersey	1	9,041	26	38	---	1	7	891	---	378	76	15,378	274	6,459	2	---	1,787	4
Pennsylvania	4	10,449	106	24	3	---	4	---	---	174		15,732	445	5,469	18	---	1,901	4
EAST NORTH CENTRAL																		
Ohio	1	5,745	92	1	31	---	3	150	---	10,490	19	34,516	430	1,228	74	---	1,911	1
Indiana	---	1,686	135	2	2	2	1	100	---	852	164	3,360	155	680	---	---	335	31
Illinois	---	7,261	148	4	10	---	11	1,042	1	1,098	8	10,876	378	2,140	123	---	4,047	8
Michigan	---	8,979	64	6	15	---	---	567	---	255	123	16,670	360	2,196	7	---	1,353	2
Wisconsin	---	12,862	23	5	---	---	1	90	---	7,259	10	20,179	111	2,935	---	---	840	3

WEST NORTH CENTRAL																		
Minnesota		2,446	85	19	3	1				30	2	14,744	92				162	4
Iowa		979	64					23		7,679	3	2,696	39	439			448	
Missouri		570	46			9	3			350	2	2,880	280	272			695	3
North Dakota		184	9		2		1			1,220		2,948	18	99			392	
South Dakota		355	23							49		1,314	7	460			96	2
Nebraska	1	494	38							469	2	703	22	895			57	6
Kansas		2,082	56	1	5		4	346		1,853	11	6,252	77	1,547			527	3
SOUTH ATLANTIC																		
Delaware		58	13									187	20	3			12	
Maryland		2,073	63	1		4	3	214		665		8,779	126	1,183	2		1,279	
District of Columbia		487	6	1	1					1,281	11	1,172	38	235			433	
Virginia		1,496	62			809				28,178	80	8,628	252	883		7	2,108	2
West Virginia		654	40							28,577		5,216	75	278			384	2
North Carolina		2,069	119		1					1,125	67	14,821	144			1	280	3
South Carolina		927	457	1	49			398	188	30,181	906	3,534	117	942	1	138	2,690	
Georgia	1	494	57		8	1			816	6,721	29	4,268	105	1,529		8	552	2
Florida		1,000	30	15	6	2	3	126	1,736	697	38	2,035	115	626	3	3	496	4
EAST SOUTH CENTRAL																		
Kentucky		681	51	2	6		2			28,568	9	1,339	151	848		1	639	3
Tennessee		784	60	1		19	3	212		7,508	3	3,525	306	549	8	14	1,540	5
Alabama		585	83	4			2	32		19,928	180	4,972	137	711		5	1,916	3
Mississippi		2,313	66	233	1,320				1,235	43,445	2,077	7,774	134	2,389	23	497	7,747	5
WEST SOUTH CENTRAL																		
Arkansas		472	75	11	48		1	77		17,667	85	1,653	44	130		14	1,308	3
Louisiana		333	72	19	20		1	62	165	20,452	95	1,595	111	414		6	568	10
Oklahoma		247	55	4	1		3			9,852	92	720	53	105		7	646	18
Texas	1	4,943	481	130	2,068		28			84,691	1,383	11,156	243	1,060	20	199	7,314	36
MOUNTAIN																		
Montana		1,003	10	1			2	286		5,895	5	2,637	22	745			128	
Idaho		177	2					24		138	2	519	6	223			23	3
Wyoming		216	10	1			1	171		1,620	1	796	10	341			50	1
Colorado		1,366	59		7		1			3,684	12	3,929	38	1,582			1,005	7
New Mexico		258	21		2	5	1	97		134	1	570	13	107		3	362	2
Arizona		321	37	7	4	246	1	218		3,945	11	3,143	21	354		4	866	
Utah		769			1	1	1	163		9,183	8	292	9	1,025			329	5
Nevada		52	1		1					327		28	5	90			63	
PACIFIC																		
Washington		3,280	54	1			8	780		522		2,079	101	1,577			849	21
Oregon		966	42	1						2,692	5	1,125	62	672			554	10
California [2]		14,298	379	33	87		14	5,207		10,939	566	16,780	585	11,583			1,688	70
Total	12	128,054	3,531	591	3,946	1,100	142	13,044	4,142	402,574	6,378	305,768	7,046	61,511	387	907	62,833	283
First quarter 1943	28	127,634	3,917	630	3,929	528	161	113,965	2,391	81,222	5,016	201,111	5,577	83,743	367	900	57,938	338
Median, 1939-43	18	126,099	4,221	588	1,803	226	148	[3] 67,814	8,330	151,656	5,016	201,111	681	65,174	367	1,477	59,690	305
Alaska		18	6					10		707	3	386	4	32			32	
Hawaii Territory		618	6	7	475			39	14	827	[4] 358	39	18	1,011			33	2
Panama Canal Zone [5]		61	23	3	13			69			310	160	2	160			[6] 93	

See footnotes at end of table

Consolidated monthly State morbidity reports for January, February, and March 1944—Continued

Division and State	Puerperal septicemia	Rabies in animals	Rabies in man	Rocky Mountain spotted fever	*Scarlet fever	Septic sore throat	*Smallpox	Tetanus	Trachoma	Trichinosis	*Tuberculosis, all forms	Tuberculosis, respiratory	Tularemia	*Typhoid and paratyphoid fever	Paratyphoid fever	Typhus fever	*Undulant fever	Vincent's infection	*Whooping cough
NEW ENGLAND																			
Maine					396	6				1	166	146		5			9	20	174
New Hampshire					194	1					57			3			1	9	34
Vermont					160						51			1			20	5	315
Massachusetts		1			4,899	81		3	1	9	879	815	1	22	15		10		1,092
Rhode Island		1			216	34		1			229	222		1			1	1	142
Connecticut					1,169	60				4	386	369		3	2		15		300
MIDDLE ATLANTIC																			
New York		63			6,917	334		8		48	2,874	2,724	2	41	8	1	48		1,866
New Jersey				1	2,573	27		3		14	987			6	2		12		601
Pennsylvania			2		5,393				1	2	2,178		1	37		1	25		1,426
EAST NORTH CENTRAL																			
Ohio		40	1		5,127	7	1	1		38	1,504	1,468	1	41	2		21		1,163
Indiana					1,945	26	15			1	580	557	6	239	2	1	17	117	253
Illinois		104			4,794	77	5	7	33		2,289	2,116	9	12	1		35	100	745
Michigan		14			3,007	141	1	2	3		1,464			20	7		19	102	1,172
Wisconsin					4,140	11					653		1	2			20		1,044
WEST NORTH CENTRAL																			
Minnesota					2,455	23	1		2		508		2	3			63	10	367
Iowa					1,988	6	19				124	124		8			63		215
Missouri		4			1,396	7	3	2	157		598		3	17	1	2	7		153
North Dakota					483	6	1		11		101	92		3			1	13	50
South Dakota					496		1		8		137			1			2		22
Nebraska					898		2				52								217
Kansas		7			1,372	14	7	1	3		168	155	2	4		1	30	73	390
SOUTH ATLANTIC																			
Delaware					115						50	50							6
Maryland		10			2,312	50		2			897	626	1	4		1	4	11	367
District of Columbia		27	1		2,118						572	562							47
Virginia					917	339					1,186	1,186	16	16	1	3	10		839
West Virginia					849	5					368			23			1		467
North Carolina					579	9					310	304	4	5		18	6		1,685

South Carolina		54	1		132	57	4	1			150		6	15	3	18	7		865
Georgia	1		1		212	40	2	4			618	618	22	20	6	101	26	50	152
Florida		6			174	17	1	4		1	279	154		28	8	40	3	98	306
EAST SOUTH CENTRAL																			
Kentucky			1		954	37	3				572	558	1	46			1		711
Tennessee				1	1,046	33	4	5	1		968		17	15		12	4	113	321
Alabama		37			186		3	1			654		4	8		94	12		252
Mississippi	84				130		9		13		461	447	10	21		14	8		3,374
WEST SOUTH CENTRAL																			
Arkansas		77	1		104	244	14	3	111		303	239	4	16			8		182
Louisiana		37	1		100	93	1	6			535	533	6	39	2	23	10		37
Oklahoma					403	38	3		35		428		2	12			7	6	80
Texas			1		1,044	22	25		27		2,260		3	73	4	171	52		1,931
MOUNTAIN																			
Montana					693	37	4				72		1	1			4	3	90
Idaho					584	5	1				29	28		3	1		1		63
Wyoming					107	5			23		19		1	1			1	4	104
Colorado		1			757	2	2				400			7	1		9		376
New Mexico		13			136	4	3		11		246	241		11			8		52
Arizona					227	11	1		103		279			9			4		413
Utah					1,971	25					37	28					2		257
Nevada	[illegible]				1	12			2		18						1	32	22
PACIFIC																			
Washington					3,444	24	7		1		676	670		7	3	1	17	24	679
Oregon					1,441	8	1		19		195			9			6	61	347
California		248	1		4,951		15	8	46	12	2,387	2,265	1	58	20	5	53		1,102
Total	87	744	11	2	75,727	1,978	159	62	611	130	30,902	17,297	127	925	89	507	684	852	26,967
First quarter 1943	83	734	4	4	50,075	2,513	332	52	763	68	27,061	15,065	237	651	86	640	585	436	52,715
Median, 1939–43	86	893	7	9	51,491	3,309	602	59	784	102	24,070	13,384	265	951		390	624	499	53,108
Alaska					2	2					48	44		1				3	22
Hawaii Territory					23	10		4	1		281	261		6	3	41	2		168
Panama Canal Zone [5]											[6] 14	[6] 14		9	8				[6] 11

*Diseases marked with an asterisk (*) are reportable by law or regulation in all the States, including the District of Columbia. Typhoid fever is reportable in all States; paratyphoid fever in all except 6 States. Syphilis is reportable in all States and the District of Columbia but is not included in the table.

[1] New York City only.

[2] On pages 346 and 377 of the PUBLIC HEALTH REPORTS of the issues of Mar. 10 and 17, 1944, respectively, 4 cases of anthrax are reported in California. These are errors and should read 4 cases of botulism.

[3] 3-year (1941-43) average.

[4] Off-shipping.

[5] Includes the cities of Colon and Panama.

[6] In the Canal Zone only.

The following list includes certain rare conditions, diseases of restricted geographical distribution, and those reportable in or reported by only a few States.

Actinomycosis: Massachusetts 1, Illinois 3, Michigan 1, Minnesota 8, Missouri 1, Maryland 1, Tennessee 1.

Botulism: Washington 3, California 3.

Coccidioidomycosis: Arizona 18, California 7.

*Conjunctivitis: Massachusetts 120 (suppurative), Connecticut 11, Ohio 4 (pink eye), Michigan 95 (kerato), 69 (pink eye), North Dakota 2, Kansas 10 (pink eye), Maryland 23, Georgia 19, Florida 11, Tennessee 1 (kerato), Montana 21 (pink eye), Idaho 5 (pink eye), Wyoming 9, New Mexico 2, Washington 8 (kerato), California 12 (acute infectious of newborn), Hawaii 2.

Dengue: South Carolina 4, Texas 12, Hawaii 180.

Diarrhea and enteritis: New Jersey 5 (diarrhea only), Ohio 3, Illinois 2 (diarrhea only) Michigan 16 (diarrhea only), Maryland 27 (diarrhea only), South Carolina 2,001 (diarrhea only), Florida 5 (diarrhea only), Wyoming 1 (diarrhea only), New Mexico 29, Nevada 15 diarrhea only), Washington 2.

Dog bite Illinois 1,843 (all animals), Michigan 1,054.

Food poisoning: Indiana 9, Illinois 39, Louisiana 9, New Mexico 4, Nevada 5, California 222.

Granuloma inguinale: Missouri 15, Florida 48, Tennessee 6, Mississippi 144, Louisiana 24, Arizona 5, Washington 13.

Impetigo contagiosa: Indiana 5, Illinois 6, Michigan 328, Missouri 4, North Dakota 18, Kansas 21, Montana 2, Oregon 104, Alaska 6, Hawaii 41.

Jaundice Indiana 6, Illinois 5, Maryland 1, Florida 10, Wyoming 3, Arizona 2, Utah 4, California 101, Alaska 93.

Leprosy: Illinois 1, Louisiana 4, Texas 3, California 1, Hawaii 9.

Lymphocytic choriomeningitis: Tennessee 2.

Lymphogranuloma venereum: Missouri 8, Florida 68, Tennessee 11, Louisiana 50.

Plague (human): Hawaii 4.

Psittacosis: Washington 1.

Relapsing fever: Texas 6, Panama Canal Zone 1.

Rheumatic fever: Illinois 90, Michigan 65, Missouri 20, Maryland 80, Georgia 9, Arizona 1, Utah 90, Washington 3, California 156

Ringworm: Michigan 357, Maryland 1.

Silicosis. New Mexico 1, Utah 1.

Weil's disease: Michigan 19, Hawaii 3.

WEEKLY REPORTS FROM CITIES

City reports for week ended June 3, 1944

This table lists the reports from 86 cities of more than 10,000 population distributed throughout the United States, and represents a cross section of the current urban incidence of the diseases included in the table.

	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
NEW ENGLAND												
Maine:												
Portland	0	0	---	0	38	0	2	0	7	0	0	2
New Hampshire:												
Concord	0	0	------	0	2	0	0	0	0	0	0	0
Vermont:												
Barre	0	0	------	0	0	0	0	0	1	0	0	2
Massachusetts:												
Boston	2	0	------	1	84	1	10	1	58	0	0	8
Fall River	0	1	------	0	11	0	1	0	1	0	0	0
Springfield	0	0	------	0	10	0	1	0	10	0	0	7
Worcester	0	0	------	0	3	0	4	0	9	0	0	0
Rhode Island:												
Providence	0	1	------	0	20	0	2	0	2	0	0	6
Connecticut:												
Bridgeport	0	0	------	0	0	0	1	0	------	0	0	0
Hartford	2	0	------	0	9	2	3	0	13	0	0	2
New Haven	0	0	------	0	28	1	1	0	4	0	0	2
MIDDLE ATLANTIC												
New York:												
Buffalo	0	0	------	1	10	0	5	0	12	0	0	0
New York	8	1	2	1	311	33	57	2	190	0	2	18
Rochester	0	0	------	0	56	0	1	0	4	0	0	1
Syracuse	0	0	------	0	4	1	1	0	0	0	0	12
New Jersey:												
Camden	0	0	------	0	1	0	0	0	5	0	0	0
Newark	0	0	------	0	133	1	2	0	23	0	0	6
Trenton	1	0	------	0	0	0	0	0	8	0	0	0
Pennsylvania:												
Philadelphia	5	0	------	1	52	11	9	0	61	0	1	8
Pittsburgh	1	0	------	0	9	3	4	0	13	0	0	2
Reading	0	0	------	0	0	0	0	0	1	0	0	1
EAST NORTH CENTRAL												
Ohio:												
Cincinnati	1	0	------	0	20	3	0	0	33	0	0	4
Cleveland	0	0	------	0	12	5	5	0	63	0	1	6
Columbus	0	0	------	0	9	1	0	0	3	0	0	6
Indiana:												
Fort Wayne	0	0	------	0	0	0	2	0	0	0	0	0
Indianapolis	1	0	------	0	44	3	3	0	17	0	0	8
South Bend	0	0	------	0	0	0	0	0	1	0	0	0
Terre Haute	0	0	------	0	0	0	0	0	2	0	0	0
Illinois:												
Chicago	0	0	1	0	122	10	20	0	91	0	0	15
Michigan:												
Detroit	6	0	1	1	147	4	14	0	88	0	2	40
Flint	0	0	------	0	0	0	0	0	0	0	0	0
Grand Rapids	0	0	------	0	3	0	0	0	1	0	0	0
Wisconsin:												
Kenosha	0	0	------	0	188	0	0	0	1	0	0	6
Milwaukee	1	0	------	0	233	0	1	0	45	0	0	16
Racine	0	0	------	0	117	0	0	0	1	0	0	2
Superior	0	0	------	0	3	0	0	0	7	0	0	0
WEST NORTH CENTRAL												
Minnesota:												
Duluth		0	------	0	131	0	8	0	8	0	0	1
Minneapolis	1	0	------	0	70	0	4	1	24	0	2	2
St. Paul	0	0	------	0	38	3	10	0	25	0	0	2
Missouri:												
Kansas City	1	0	------	0	14	0	2	0	3	0	0	0
St. Joseph	0	0	------	0	0	2	0	0	1	1	0	0
St. Louis	0	0	------	1	16	6	10	0	8	0	0	14

City reports for week ended June 3, 1944—Continued

	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
WEST NORTH CENTRAL—continued												
Nebraska:												
Omaha	1	0	------	0	25	2	3	0	8	0	0	0
Kansas:												
Topeka	0	0	------	0	47	0	2	0	3	0	0	1
Wichita	0	0	------	0	10	1	4	0	8	0	0	1
SOUTH ATLANTIC												
Delware:												
Wilmington	0	0	------	0	1	1	0	0	2	0	0	0
Maryland:												
Baltimore	5	0	------	0	120	0	7	0	38	0	1	30
Cumberland	0	0	------	0	1	0	0	0	1	0	0	0
Frederick	0	0	------	0	0	0	0	0	2	0	0	0
District of Columbia:												
Washington	0	0	------	0	88	0	4	0	35	0	0	1
Virginia:												
Lynchburg	0	0	------	0	1	0	0	0	2	0	0	1
Richmond	1	0	------	0	10	0	1	0	1	0	0	1
Roanoke	0	0	------	0	4	0	0	0	1	0	0	6
West Virginia:												
Charleston	0	0	------	0	0	0	0	0	4	0	0	0
Wheeling	0	0	------	0	38	0	1	0	10	0	0	6
North Carolina:												
Raleigh	0	0	------	0	28	0	0	0	0	0	0	1
Wilmington	0	0	------	0	4	0	0	0	0	0	1	5
Winston-Salem	0	0	------	0	16	0	1	0	1	0	0	0
South Carolina:												
Charleston	0	0	1	0	0	0	1	0	0	0	1	0
Georgia:												
Atlanta	0	0	5	1	2	0	0	0	2	0	0	------
Brunswick	0	0	------	0	0	0	0	0	0	0	0	0
Savannah	0	0	------	0	0	0	1	0	1	0	0	0
Florida:												
Tampa	1	0	------	0	0	1	0	0	0	0	1	1
EAST SOUTH CENTRAL												
Tennessee:												
Memphis	0	0	1	0	13	0	3	0	1	0	0	10
Nashville	0	0	------	0	17	0	1	0	1	0	0	0
Alabama:												
Birmingham	0	0	1	0	0	0	1	0	1	0	0	0
Mobile	0	0	------	0	0	4	2	0	0	0	0	0
WEST SOUTH CENTRAL												
Arkansas:												
Little Rock	0	0	------	0	6	0	0	0	0	0	0	1
Louisiana:												
New Orleans	0	0	------	1	11	1	8	5	0	0	2	2
Shreveport	0	0	------	0	2	0	3	0	1	0	0	0
Texas:												
Dallas	0	0	------	0	36	0	0	0	1	0	0	3
Galveston	0	0	------	0	1	0	0	0	0	0	0	0
Houston	0	0	------	0	3	0	11	1	0	0	2	2
San Antonio	2	0	------	1	2	1	2	0	1	0	0	4
MOUNTAIN												
Montana:												
Billings	0	0	------	0	8	0	1	0	2	0	0	1
Great Falls	0	0	------	0	1	0	0	0	0	0	0	0
Helena	0	0	------	0	1	0	0	0	0	0	0	0
Missoula	0	0	------	0	6	0	0	0	2	0	0	0
Colorado:												
Denver	0	0	------	1	47	0	2	0	13	0	0	3
Pueblo	0	0	------	0	6	0	1	0	5	0	1	0
Utah:												
Salt Lake City	0	0	------	1	37	0	0	0	37	0	0	3

City reports for week ended June 3, 1944—Continued

	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
PACIFIC												
Washington:												
Seattle	1	0	------	0	63	1	8	0	34	0	0	5
Tacoma	1	0	------	0	21	2	1	0	9	0	0	1
California:												
Los Angeles	3	0	6	0	345	0	6	2	16	0	0	1
Sacramento	0	1	------	0	58	0	1	0	4	0	0	2
San Francisco	0	0	2	0	211	2	2	1	19	0	0	3
Total	45	4	18	11	3,183	106	256	13	1,100	1	17	294
Corresponding week, 1943	60	------	48	22	6,780	------	338	------	1,036	1	17	1,022
Average, 1939–43	66	------	50	[1] 15	[2] 4,900	------	[1] 299	------	1,117	4	23	1,196

[1] 3-year average, 1941–43.
[2] 5-year median.

Dysentery, amebic.—Cases. Chicago, 1; Kansas City, 1; St. Louis, 1; San Francisco, 1.
Dysentery, bacillary.—Providence, 2; Los Angeles, 1; New York City, 1; Detroit, 2; Charleston, S. C., 40; Nashville, 1.
Dysentery, unspecified.—Cases: San Antonio, 20.
Rocky Mountain spotted fever.—Cases. Philadelphia, 2; Wilmington, Del., 1; Lynchburg, 1; Richmond, Va., 1.
Typhus fever, endemic.—Cases: Atlanta, 3: Savannah, 1; Tampa, 1; Birmingham, 1; Houston, 1; San Antonio, 1.

Rates (annual basis) per 100,000 population, by geographic groups, for the 86 cities in the preceding table (estimated population, 1943, 34,264,900)

	Diphtheria case rates	Encephalitis, infectious, case rates	Influenza		Measles case rates	Meningitis, meningococcus, case rates	Pneumonia death rates	Poliomyelitis case rates	Scarlet fever case rates	Smallpox case rates	Typhoid and paratyphoid fever, case rates	Whooping cough case rates
			Case rates	Death rates								
New England	10.4	5.2	0.0	2.6	533	10.4	65.0	2.6	273	0.0	0.0	75
Middle Atlantic	6.8	0.5	0.9	0.9	261	22.2	35.9	0.9	144	0.0	1.4	22
East North Central	5.5	0.0	1.2	0.6	522	16.0	27.4	0.0	217	0.0	1.8	63
West North Central	6.0	0.0	0.0	2.0	690	28.0	75.8	2.0	155	2.0	4.0	42
South Atlantic	11.4	0.0	9.8	1.6	511	3.3	26.1	0.0	163	0.0	6.5	85
East South Central	0.0	0.0	11.7	0.0	175	23.3	40.8	0.0	17	0.0	0.0	58
West South Central	5.7	0.0	0.0	5.7	173	5.7	68.1	17.0	9	0.0	11.4	34
Mountain	0.0	0.0	0.0	16.5	873	0.0	33.0	0.0	486	0.0	0.0	66
Pacific	8.6	1.7	12.7	0.0	1,199	8.6	30.9	5.2	141	0.0	0.0	21
Total	6.9	0.9	2.7	1.5	486	16.2	39.1	2.0	168	0.2	2.6	45

TERRITORIES AND POSSESSIONS

Panama Canal Zone

Notifiable diseases—April 1944.—During the month of April 1944, certain notifiable diseases were reported in the Panama Canal Zone, including terminal cities, as follows:

Disease	Panama		Colon		Canal Zone		Outside the Zone and terminal cities		Tota	
	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths
Chickenpox	7		1		4		2		14	
Diphtheria	2						7		9	
Dysentery (amebic)					2		4	1	6	1
Dysentery (bacillary)					2				2	
Malaria [1]	9				32		35	3	76	3
Measles					32		2		34	
Meningitis, meningococcus	1	1			2				3	1
Mumps	3				9		2		14	
Paratyphoid fever					1		3		4	
Pneumonia		6		5	25			2	[2] 25	13
Tuberculosis		16		5	8	2		5	[2] 8	28
Typhoid fever					1		1		2	
Whooping cough					9				[2] 9	

[1] 25 recurrent cases.
[2] In the Canal Zone only.

Puerto Rico

Notifiable diseases—4 weeks ended May 20, 1944.—During the 4 weeks ended May 20, 1944, cases of certain notifiable diseases were reported in Puerto Rico as follows:

Disease	Cases	Disease	Cases
Chickenpox	111	Ophthalmia neonatorum	1
Diphtheria	48	Pellagra	1
Dysentery	21	Poliomyelitis	4
Erysipelas	1	Puerperal fever	2
Filariasis	13	Syphilis	736
German measles	23	Tetanus	26
Gonorrhea	527	Tetanus, infantile	1
Influenza	89	Trachoma	1
Leprosy	3	Tuberculosis (all forms)	729
Lymphogranuloma inguinale	1	Typhoid fever	16
Malaria	904	Typhus fever (endemic)	18
Measles	32	Whooping cough	58
Mumps	1		

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—Week ended May 20, 1944.—During the week ended May 20, 1944, cases of certain communicable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox		11	6	191	450	23	53	46	97	877
Diphtheria		3	2	18		2	2			22
Dysentery (bacillary)				1						1
German measles		7		252	111	5	43	6	58	482
Influenza		5			2				6	13
Measles	6	2	19	977	711	340	99	104	22	2,280
Meningitis, meningococcus					5				1	6
Mumps		6	1	198	169	39	6	30	29	478
Poliomyelitis					1					1
Scarlet fever		8	7	46	211	63	14	90	68	507
Tuberculosis (all forms)		14	17	60	54	9	1	1	27	183
Typhoid and paratyphoid fever				12			1	1		14
Undulant fever				1	1			3		5
Whooping cough		30		39	38	3	22	4	23	159

CUBA

Habana—Communicable diseases—4 weeks ended May 27, 1944.—During the 4 weeks ended May 27, 1944, certain communicable diseases were reported in Habana, Cuba, as follows:

Disease	Cases	Deaths	Disease	Cases	Deaths
Diphtheria	23	6	Tuberculosis	5	
Measles	23	2	Typhoid fever	33	1
Poliomyelitis	1				

Provinces—Notifiable diseases—4 weeks ended May 20, 1944.—During the 4 weeks ended May 20, 1944, cases of certain notifiable diseases were reported in the Provinces of Cuba as follows:

Disease	Pinar del Rio	Habana [1]	Matanzas	Santa Clara	Camaguey	Oriente	Total
Cancer	1		3	4	2	16	26
Chickenpox	1	4	1			3	9
Diphtheria	1	30	3	4		2	40
Hookworm disease		38					38
Leprosy		1					1
Lethargic encephalitis		1					1
Malaria	18		6	2		180	206
Measles		35	4	5			44
Poliomyelitis			2	1			4
Tuberculosis	12	76	15	21	18	52	[illegible]
Typhoid fever	11	47	10	26	13	19	121
Undulant fever					1		3

[1] Includes the city of Habana.

NEW ZEALAND

Notifiable diseases—4 weeks ended May 20, 1944.—During the 4 weeks ended May 20, 1944, certain notifiable diseases were reported in New Zealand as follows:

Disease	Cases	Deaths	Disease	Cases	Deaths
Actinomycosis	1		Poliomyelitis	1	
Cerebrospinal meningitis	9		Puerperal fever	4	
Diphtheria	93	2	Scarlet fever	587	
Dysentery (bacillary)	22	1	Tetanus		1
Erysipelas	46		Trachoma	3	
Food poisoning	3		Tuberculosis (all forms)	207	54
Lead poisoning	2		Typhoid fever	8	
Ophthalmia neonatorum	1		Undulant fever	5	

PERU

Notifiable diseases—Year 1943.—During the year 1943, cases of certain notifiable diseases were reported in Peru as follows:

Disease	Cases	Disease	Cases
Cerebrospinal meningitis	43	Poliomyelitis	104
Diphtheria	767	Relapsing fever	81
Dysentery	5,659	Scarlet fever	412
Influenza	23,620	Smallpox	1,794
Leprosy	2	Typhoid and paratyphoid fever	3,034
Lethargic encephalitis	3	Typhus fever	1,405
Malaria	40,643	Undulant fever	512
Measles	2,441	Whooping cough	17,640
Plague	66		

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

NOTE.—Except in cases of unusual incidence, only those places are included which had not previously reported any of the above-mentioned diseases, except yellow fever, during the current year. All reports of yellow fever are published currently.

A table showing the accumulated figures for these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.

(Few reports are available from the invaded countries of Europe and other nations in war zones.)

Cholera

India—Calcutta.—For the week ended May 20, 1944, 54 deaths from cholera were reported in Calcutta, India.

Plague

Belgian Congo—Costermansville Province—Kibirumue.—For the week ended June 10, 1944, 1 death from plague was reported in Kibirumue, Costermansville Province, Belgian Congo.

Egypt.—Plague has been reported in Egypt as follows: Ismailiya—week ended June 3, 1944, 11 cases with 4 deaths, including 8 cases with 3 deaths in the southern area; Port Said—week ended May 27, 1944, 3 cases, 3 deaths; week ended June 3, 1944, 2 cases, 1 death.

French West Africa—Dakar.—On June 4, 1944, 2 deaths from plague were reported in Dakar, French West Africa.

Morocco (French)—Casablanca.—For the month of April 1944, 2 cases of plague were reported in Casablanca region, French Morocco.

Smallpox

Algeria.—Smallpox has been reported in Algeria as follows: May 1–10, 1944, 72 cases; May 11–20, 1944, 37 cases; May 21–31, 1944, 32 cases.

Great Britain—England—Birkenhead.—During the week ended May 13, 1944, 1 case of smallpox was reported in Birkenhead, England.

Greece—Hevros Department.—Smallpox has been reported in Hevros Department, Greece, as follows: January 1944, 106 cases; February 11–29, 1944, 103 cases.

India.—Smallpox has been reported in India as follows: Bombay—week ended May 13, 1944, 49 cases, 27 deaths; Calcutta—week ended May 20, 1944, 258 deaths.

Nigeria.—For the week ended May 6, 1944, 174 cases of smallpox with 46 deaths were reported in Nigeria.

Typhus Fever

Algeria.—Typhus fever has been reported in Algeria as follows: May 1–10, 1944, 92 cases; May 11–20, 1944, 70 cases; May 21–31, 1944, 72 cases.

Bulgaria.—For the week ended March 18, 1944, 73 cases of typhus fever were reported in Bulgaria.

Chile.—For the period March 26 to April 22, 1944, 34 cases of typhus fever with 2 deaths were reported in Chile. Provinces reporting the highest incidence are as follows: Antofagasta, 12 cases, 1 death; Santiago, 10 cases; Valparaiso, 8 cases.

China—Kunming (Yunnan Fu).—For the week ended May 27, 1944, 10 cases of typhus fever with 1 death were reported in Kunming (Yunnan Fu), China.

Greece.—Typhus fever has been reported in Greece as follows: January 1944, 28 cases; February 1944, 20 cases.

Guatemala.—For the month of April 1944, 399 cases of typhus fever with 94 deaths were reported in Guatemala, including 256 cases with 66 deaths reported in the central region.

Hungary.—For the week ended May 20, 1944, 153 cases of typhus fever (including 99 cases in Subcarpathia) were reported in Hungary.

Iran.—For the period April 1, 1944, to May 26, 1944, 2,562 cases of typhus fever with 192 deaths were reported in Iran.

Irish Free State—Roscommon County—Castlerea.—For the week ended May 27, 1944, 1 case of typhus fever was reported in Castlerea, Roscommon County, Irish Free State.

Morocco (French).—For the month of April 1944, 409 cases of typhus fever were reported in French Morocco.

Tunisia.—Typhus fever has been reported in Tunisia as follows: May 1–10, 1944, 109 cases; May 11–20, 1944, 16 cases.

Yellow Fever

Colombia.—During the month of March 1944, deaths from yellow fever have been reported in Colombia as follows: La Mesa, Boyaca Department, 1; Samana, Caldas Department, 1; La Belleza, Santander Department, 2.

×

FEDERAL SECURITY AGENCY

UNITED STATES PUBLIC HEALTH SERVICE

THOMAS PARRAN, *Surgeon General*

DIVISION OF PUBLIC HEALTH METHODS

G. ST. J. PERROTT, *Chief of Division*

The PUBLIC HEALTH REPORTS, first published in 1878 under authority of an act of Congress of April 29 of that year, is issued weekly by the United States Public Health Service through the Division of Public Health Methods, pursuant to the following authority of law: United States Code, title 42, sections 7, 30, 93; title 44, section 220.

It contains (1) current information regarding the prevalence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

The PUBLIC HEALTH REPORTS is published primarily for distribution, in accordance with the law, to health officers, members of boards or departments of health, and other persons directly or indirectly engaged in public health work. Articles of special interest are issued as reprints or as supplements, in which forms they are made available for more economical and general distribution.

Requests for and communications regarding the PUBLIC HEALTH REPORTS, reprints, or supplements should be addressed to the Surgeon General, United States Public Health Service, Washington 14, D. C. Subscribers should remit direct to the Superintendent of Documents, Washington 25, D. C.

Librarians and others should preserve their copies for binding, as the Public Health Service is unable to supply the general demand for bound copies. Indexes will be supplied upon request.

UNITED STATES GOVERNMENT PRINTING OFFICE, WASHINGTON . 1944

For sale by the Superintendent of Documents, Washington 25, D. C.
Price 5 cents. Subscription price $2.50 a year

Public Health Reports

VOLUME 59 JUNE 30, 1944 NUMBER 26

IN THIS ISSUE

CONTENTS

Public Health Reports

Vol. 59 • JUNE 30, 1944 • *No. 25*

A SIEVE DEVICE FOR SAMPLING AIR-BORNE MICROORGANISMS [1]

By H. G. duBuy, *Associate Physiologist*, and L. R. Crisp, *Associate Mechanical Engineer, United States Public Health Service*

A sieve device for the sampling of air-borne microorganisms has been constructed. As in most other impinging devices, use is made of the standard petri dish. Its advantages over the other impinging devices are that it is compact and the inlets cover an area approaching that of the open plate. Thus, not only the floating nonsettling microorganisms are impinged, but also those which settle over an area normally covered by an open plate.

For obtaining samples of air-borne bacteria, the sieve device uses the impinging principle as employed first by Winslow (*1*) in 1908, who drew air into two flasks with a layer of nutrient agar in the bottom, on which microorganisms contained in the air were impinged. Hollaender and Dalla Valle (*2*) impinged the air on a standard petri dish, using a funnel in place of the bottle opening to impinge the air on the agar surface. In the sieve device, the air current is directed toward the agar surface by small openings in a sieve plate kept at a short distance from the agar surface. The bottle device of Sharf (*3*) furnished some indication that the use of small openings might not materially affect the sampling efficiency, since in that device the air is allowed to enter through a relatively small opening. The slit device as developed by Bourdillon et al. (*4*) furnished a method of determining the distance of the impinging inlet to the agar surface. The description of an additional sampling device of the impinger type might be justified, since in our hands the sampling efficiency of this device compares favorably with that of other impinger devices tested.

The device consists of two parts, a box which is equipped with an air outlet and holds a standard petri dish with nutrient agar, and a cover consisting of a brass plate with 300 openings each 0.796 mm. in diameter (No. 68 drill). This cover fits the box airtight and is fastened by means of two toggle clamps. Figure 1 shows a model in which a bayonet type lock is used. However, the use of toggle clamps simplifies the exchange of plates.

[1] From the Industrial Hygiene Research Laboratory, National Institute of Health.

The sieve plate itself can be adjusted to any desired distance from the agar surface of the petri dish, by movement along the screw thread of the plate and the margin of the cover, by means of wing handles on the sieve plate. The distance between the sieve plate and the agar surface is given by an indicator in the middle of the plate. In case a bayonet type lock is used, the indicator should be provided with a clevis to prevent it from making a hole in the agar while adjusting the sieve plate. Details for construction and essential dimensions are given in figure 2. The latest model is made of plastic except for the sieve plate and a small ring carrying the screw threads. These parts are made of brass.

The air enters through the openings of the sieve plate and impinges on the agar surface. It then passes around the petri dish to the center outlet on the bottom of the box and the outlet tube to a flowmeter and a suction pump. The air volume passing through the openings in the sieve plate is determined by the inside diameter of the outlet tubing, since the total surface of the 300 openings is larger than that of the outlet tubing. In our case, the diameter of this outlet is 4 mm., allowing sampling at varying rates of airflow. The bottom of the box is provided with four spacer pins of 0.7 mm. thickness, which support the petri dish and allow the air to pass to the outlet. In case samples have to be taken through small openings from an experimental room, three or four funnel clamps can be attached to the margin of the cover of the sieve device, while a washer prevents air leakage between funnel and cover. (See fig. 2, funnel clamp.) The addition of a funnel cuts the efficiency of the sieve device down to that of the funnel device, or roughly 20 percent. Before use the sieve plate is wiped with ethanol and flamed.

TABLE 1.—*Bacterial counts obtained by exposing open plates for 10 minutes and by taking 10-minute air samples with the funnel and sieve samples at a flow rate of 1 cu. ft. per minute. In the case of the open plates each run is represented by the average of six plates. Room supplied with dust*

Method	Number of runs	Bacterial count per 10 cu. ft. of air	
Open plate	27	18.8 Exposed 10 min.	±.4
Funnel device	27	70.4	±7.5
Sieve device, 150 holes	27	82.4	±6.9

In order to determine the sampling efficiency of the sieve device, air samples were taken simultaneously with the funnel device, which in our hands was the least variable of the already existing impinger devices. (Atomizing devices, by breaking up particles, have a much higher "efficiency.") The counts obtained are represented in table 1. Each run consists of the exposure of one petri dish in the funnel

FIGURE 1.—Photograph of box and cover of the sieve sampling device. Notice toggle clamps and funnel holders. The holes in the sieveplate have been made at equal distance from each other in order to secure proper spacing of the bacterial colonies.

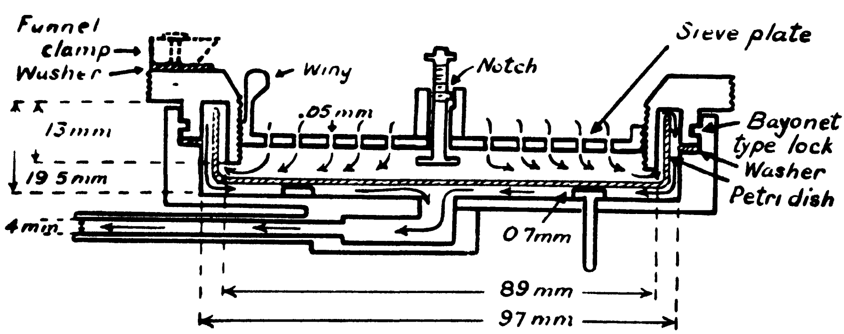


FIGURE 2.—Cross section through both parts of the sieve sampling device. The air path is indicated by arrows. In case toggle clamps are used to lock box and cover, the clevis and notch of the indicator are no longer necessary. (See fig. 1.)

FIGURE 3. Distribution of colonies over an agar plate used in the sieve sampler. Both plates represent samples of 10 cu. ft. at the rate of 1 cu. ft. per minute. (A) Sample of relatively pure air. (B) Sample of heavily contaminated air. Samples of more than 500 organisms per plate make counts less reliable as a result of overlapping.

device and one in the sieve device, simultaneously with the exposure of six open plates placed at strategic locations around the experimental room. The results show an increase in bacterial counts with the sieve device as compared with the funnel device, when a sieve plate with 150 openings is employed. The increase becomes more pronounced when a sieve plate with 300 openings is used. This increase runs parallel with a less pronounced increase of the values for the standard deviation.

TABLE 2.—*Bacterial counts obtained from room sprayed with* E. coli, *runs made as in table 1. Relative humidity of 35–45 percent*

Method	Number of runs	Bacterial count per 10 cu. ft. of air	
Open plate	18	7.7 Exposed 10 min.	±2.5
Funnel device	18	40.6	±5.4
Sieve device, 150 holes	18	50.2	±6.4
Sieve device, 300 holes	18	77.7	±7.9

This increase is partially due to the fact that the funnel device, like all other sampling devices, forces the air through one limited opening, thus preventing the impingement of those organisms, which slowly settle some distance away from this opening. In the case of the sieve device, practically all organisms settling over the area of a petri dish will enter through one of the many openings of the sieve plate. After passage through the sieve plate they will spread somewhat, since each small opening gives rise to a minature vortex. Figure 3 demonstrates the spread of the organisms when relatively pure air (A) or heavily contaminated air (B) is sampled. It is possible that two or more organisms, floating separately in the air, will hit the same place on the agar surface, but this chance is very small since they will enter through any one of the 300 holes and they will have various angular velocities while passing through the openings and the vortices underneath each opening, and thus only occasionally hit the same spot. The data show that the sampling efficiency does not decrease appreciably when the air velocity decreases. On the other hand, with velocities at the rate of 40 liters per minute or higher, decreases in total bacterial count are found due to a relative decrease in the number of marginal colonies. This result is even more pronounced when the diameter of the openings in the sieve plate is gradually decreased toward the margin. This was done in one case in order to counterbalance the effect of the decrease of resistance to airflow toward the margin of the sieve plate, which is caused by the gradually decreasing distance between inlet openings and outlet, indicating that in the sieve sampler complex relations exist between air velocity and direction of airflow. On the basis of experimental

results, all openings in the sieve plate have been made of the same diameter in the latest model.

TABLE 3.—*Relation between bacterial counts per air sample of 10 cu. ft. and rate of airflow through sieve device. Sieve plates with 150 openings. Room supplied with dust. Three sieve samplers were employed simultaneously*

Cu. ft./min.	Number of runs	Number bact./10 cu. ft.		Cu. ft./min.	Number of runs	Number bact./10 cu. ft.	
0.25	6	27	±6.4	1.5	6	20	±4.4
.5	14	31	±5.2	1.9	6	16	± .7
1.0	19	30	±8.7				

The data presented here as well as others on the comparison of this device with various sampling devices, which will be published elsewhere, show that the bacterial counts per unit of air volume of the sieve device compare favorably with those of other impinging devices.

REFERENCES

(*1*) Winslow, C.-E. A.: A new method of enumerating bacteria in air. Science, 28: 28–31 (1908).

(*2*) Hollaender, A., and DallaValle, J. M.: A simple device for sampling air-borne bacteria. Pub. Health Rep., 54: 574–577 (1939).

(*3*) Schneiter, R., Hollaender, A., Caminita, B. H., Kolb, R. W., Fraser, H. F., duBuy, H. G., Neal, P. A., and Rosenblum, H. B.: Effectiveness of ultraviolet irradiation of upper air for the control of bacterial air contamination in sleeping quarters. Preliminary report. In press.

(*4*) Bourdillon, R. B., Lidwell, O. M., and Thomas, J. C.: A slit sampler for collecting and counting air-borne bacteria. J. Hyg., 41: 197–224 (1941).

PRODUCTION OF VITAMIN K DEFICIENCY IN RATS BY VARIOUS SULFONAMIDES [1]

By A. KORNBERG, *Passed Assistant Surgeon (R)*, F. S. DAFT, *Principal Biochemist*, and W. H. SEBRELL, *Medical Director, United States Public Health Service* [2]

Vitamin K deficiency in rats is manifested by hypoprothrombinemia and hemorrhages. Feeding of a vitamin K-free ration results in an irregular production of this deficiency (*1*, *2*). The inclusion of sulfonamides in purified diets is more uniformly effective. The occurrence of hemorrhages in rats ingesting such diets was reported by Daft, Ashburn, and Sebrell (*3*). Black et al. (*4*) found that the inclusion of 0.5 percent of sulfaguanidine or succinyl sulfathiazole in diets of rats for 4 weeks resulted in a significant increase in the prothrombin time of diluted plasma which could be prevented by vitamin K. However, Black et al. were unable to demonstrate a prolongation

[1] From the Division of Physiology, National Institute of Health.

[2] With the technical assistance of Howard Bakerman.

of the clotting time of whole blood and did not report the presence of hemorrhages. Welch and Wright (*5*) noted "spontaneous bleeding" occasionally, and hypoprothrombinemia in rats fed on a 2 percent succinyl sulfathiazole diet over a period of several weeks. In the present studies, it is established that the hemorrhages originally reported (*3*) were in all probability the result of a deficiency of vitamin K. Other sulfonamides (sulfapyrazine,[3] sulfadiazine, and sulfathiazole) have been used which have been found to produce a severe hypoprothrombinemia and widespread hemorrhages rapidly and consistently. Further data are reported concerning the production, prevention, and correction of this vitamin K deficiency.

METHODS

Albino rats of Wistar or Osborne and Mendel strains, upon weaning at about 22 days, were given an experimental diet or a control diet. The experimental diet was composed of glucose ("Cerelose") 72 percent, casein 18 percent, cod liver oil 2 percent, cottonseed (Wesson) oil 3 percent, salt mixture No. 550 (*6*) 4 percent, and one of the sulfonamide drugs at a level of 1 percent. Each rat received a daily supplement of 100 micrograms of thiamine hydrochloride, 200 micrograms of riboflavin, 100 micrograms of pyridoxine hydrochloride, 200 micrograms of calcium pantothenate, 1 mg. of niacin, and 10 mg. of choline chloride. The control diet was identical except that the sulfonamide drug was replaced by an equal weight of glucose.

Casein, leached and alcohol-extracted in this laboratory, and Smaco ("vitamin test") casein were used for the most part. Other caseins (Labco, crude and leached) were also used in an experiment for the study of differences between various types of casein (table 3).

In all experiments litter mates were of the same sex and comparable weights. The rats were housed in individual metabolism cages to discourage coprophagy and permit the collection of feces.

A complete autopsy was performed on experimental and control rats. Microscopic examination of the tissues of some of the animals was carried out as described elsewhere (*7*).

Prothrombin time was determined by a micromethod adapted from a test described by Ziffren et al. (*9*).[4] Thromboplastin (4 cu. mm. beef lung, Abbott) is delivered on a glass slide. From the first drop of tail blood, 15 cu. mm. is removed and added to the thromboplastin. The mixture is stirred with a fine glass rod. The clot normally occurs about 30 seconds after contact of blood with thromboplastin. This time may vary from 20 to 40 seconds for different samples of thromboplastin. For a given sample, freshly prepared, the prothrombin time is relatively constant within any control group. Determinations on control and experimental rats were made at the same time and with the same thromboplastin. In control rats the clot was complete, firm, and elastic. In rats with marked hypoprothrombinemia, the clot was delayed, incomplete, and friable. In such cases, the first evidence of a fibrin strand was considered to be the end point. Observations were not carried beyond 600 seconds.

It is recognized that prothrombin time is not necessarily a measure of the level of prothrombin in the blood. Such terms as "blood clotting power," "prothrom-

[3] Furnished through the courtesy of Dr. Warren Cox, Mead Johnson & Co.

[4] Suggested in a personal communication by Dr. H. P. Smith, University of Iowa, Iowa City, Iowa.

bin level," and "prothrombin activity" have been used to indicate the possible blood prothrombin level as measured by prothrombin time. In this paper we have used the term "prothrombin level" in this sense. A numerical indication of blood prothrombin level is expressed as a percent. The average prothrombin time of a group of control rats (or a single, litter mate, control rat) is divided by the prothrombin time of the experimental rat and multiplied by 100.

The term "hypoprothrombinemia" was applied only to those rats whose prothrombin levels had fallen below 30 percent. Although some depletion of prothrombin was probably present at higher percentages, i. e., 30 to 50 percent, the designation of hypoprothrombinemia has been rigidly reserved for levels under 30 percent.

Hypoprothrombinemic rats were used for treatment with pure vitamin K[5] and for assay of the vitamin K activity of crude substances. In regard to their responses, it appeared to make no difference whether the hypoprothrombinemia was induced by one sulfonamide or another. In the assay of crude materials, the substance in question was administered orally within a few hours after a prothrombin determination had been made. Eighteen to 24 hours later, the prothrombin determination was repeated. The rats always continued to ingest the sulfonamide-containing diet during the treatment or assay period.

The whole blood-clotting time was determined on the first drop of tail blood collected in a capillary tube. Pieces (1 cm.) of the tube were broken at 15-second intervals and when a fibrin strand was seen to connect the broken ends of the tube, clotting was considered to have occurred. Values from rats on control diets were within the range of 60 to 120 seconds.

In the experiment designed to study the production of a vitamin K deficiency by sulfadiazine and sulfathiazole and its prevention (table 1, fig. 1), groups of 3 litter mates were used. Two rats from each litter were placed on the experimental diet containing the sulfonamide. One of these 2 rats was given orally by pipette 40 micrograms of 2-methyl-1,4-napthohydroquinone diacetate three times weekly. The third litter mate received the control diet. Smaco casein was used. Determinations of prothrombin time were made weekly for 10 weeks. The prothrombin time of the control rat served as the standard for its litter mates. Upon the death of 1 rat the 2 litter mates were sacrificed.

The experiment in which various sulfonamides were compared as to effectiveness in producing vitamin K deficiency (table 2) was set up with groups of 4, 5, 6, and 7 litter mates. One member of each litter was fed the control diet and the others were fed the various sulfonamide experimental diets. Smaco casein was used. Prothrombin determinations were made weekly for 10 weeks.

Investigation of the effect of biotin and "folic acid" (*L. casei* factor)[6] on the production by sulfadiazine of vitamin K deficiency (table 4) was conducted with groups of 4 litter mates. The experimental diet containing sulfadiazine was used. One rat was given crystalline biotin, one crystalline folic acid, one was given both of these vitamins, and the remaining litter mate was given neither. The biotin (5 micrograms) and folic acid (5 micrograms) were given orally by pipette each day. Smaco casein was used. Determinations of prothrombin time were made at 2, 3, and 4 weeks after the start of the experiment.

[5] The vitamin K preparation used throughout these studies was 2-methyl-1,4-napthohydroquinone diacetate. The potency was found to be one-half that of 2-methyl-1,4-naphthohydroquinone (Menadione) as determined by chick assay (*10*).

[6] The crystalline material used in the present studies was furnished through the courtesy of Lederle Laboratories. The source was not given but it was stated not to be identical with either of the substances described by Stokstad (*11*) as "a growth factor for *Lactobacillus casei*." The potency of the material was as follows: 0.000061 micrograms per cc. gave half maximum growth of *L. casei* and 0.0042 micrograms gave half maximum growth of *Streptococcus lactis R.*

RESULTS

Production of vitamin K deficiency by sulfadiazine or sulfathiazole and its prevention.—Feeding experimental diets containing sulfadiazine or sulfathiazole was found to produce a severe hypoprothrombinemia, prolonged clotting time, and multiple hemorrhages. These abnormalities were preventable by orally administered vitamin K (table 1, fig. 1). It may be noted that on the experimental diet prothrombin levels under 30 percent were recorded in 18 of 21 rats. Rats getting the experimental diet and in addition regular doses of vitamin K maintained prothrombin levels at or near those of their litter mates on the control diet (fig. 1). In some of the rats getting vitamin K supplements, somewhat low prothrombin levels were noted on

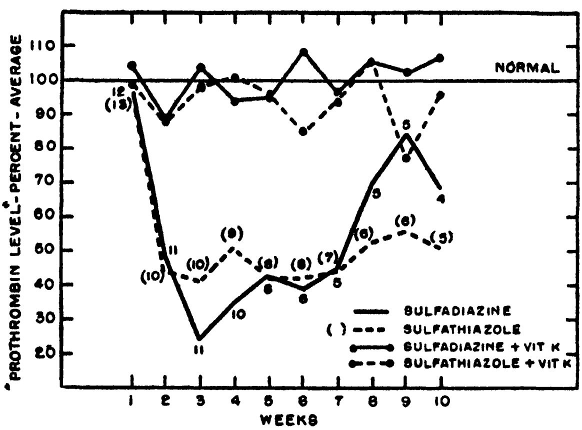


FIGURE 1.—The course of hypoprothrombinemia produced by sulfadiazine and sulfathiazole and prevented by vitamin K. (The numbers along the sulfadiazine and sulfathiazole lines indicate the number of rats whose individual values are averaged at a particular week. The lines for sulfadiazine+vitamin K and sulfathiazole+vitamin K are made up from values of the same numbers of rats (litter mates) indicated for the sulfadiazine and sulfathiazole lines respectively.)

single occasions, but normal levels were found prior to and subsequent to these low determinations.

TABLE 1.—*Hypoprothrombinemia produced by sulfadiazine and sulfathiazole and prevented by vitamin K*

Drug	Number of rats	Lowest individual prothrombin levels [1] (percent)	Average of lowest prothrombin levels (percent)
Sulfadiazine	11	5, 5, 7, 11, 16, 19, 22, 24, 24, 31, 33	18
Sulfadiazine+vitamin K [2]	11	69, 70, 70, 77, 78, 82, 82, 88, 90, 92, 93	81
Sulfathiazole	10	6, 8, 14, 19, 19, 23, 25, 26, 29, 41	21
Sulfathiazole+vitamin K [2]	10	40, 50, 64, 66, 75, 75, 76, 80, 86, 88	70

[1] Determinations were made weekly for 10 weeks. The lowest level reached by each rat is recorded here. Litter mates were used.
[2] 40 micrograms given orally by pipette 3 times weekly.

In following the weekly prothrombin levels of individual experimental rats, the lowest values were noted at the second and third week in 13 of the 21 rats. Some degree of remission occurred in all rats (except in 2 which died early of acute hemorrhage), which was generally slight and usually followed by relapses to previous levels. In 5 rats, there was a remission which over a period of weeks elevated the prothrombin level to near normal values.

Hemorrhages were noted in a variety of sites, the most common being the subcutaneous tissues of the lower extremities. Other sites where bleeding occurred with some frequency were the thymus, bladder, epididymis, eye, adrenal, testicle, stomach, kidney, retroperitoneal space, and the thoracic, abdominal, and cranial cavities. The hemorrhagic thymus had a striking appearance. The gland was purplish black in color and symmetrically enlarged to occupy as much as one-half of the thoracic cavity. Eight of the 11 animals which had prothrombin levels of less than 20 percent were observed at the time of the determination to have hemorrhages in one or more of the above-enumerated places. Evidences of spontaneous bleeding were rarely observed in rats with "prothrombin levels" over 30 percent and were never found in rats on control diets.

Whole blood clotting times of 10 rats whose prothrombin levels were less than 30 percent showed an average of 276 seconds (range 120 to 600 seconds) as compared with their 10 controls whose average was 75 seconds (range 60 to 105 seconds). In rats with milder degrees of hypoprothrombinemia, little or no prolongation of the whole blood clotting time was found.

Two rats in the vitamin K deficient group died owing to massive hemorrhage. Thirteen rats died during the experiment from causes other than vitamin K deficiency. Six of these received vitamin K supplements and 7 were vitamin K deficient. No differences in weight gain were observed between rats developing a vitamin K deficiency and litter mates in which it was prevented.

The production of a vitamin K deficiency was also studied in rats which had ingested the control diet for 3 weeks after weaning and were then given an experimental diet containing 1 percent sodium sulfadiazine. Litter mates of the same sex and starting weights were fed this experimental diet immediately upon weaning. The average weight at weaning was 35 gm. and after 3 weeks on the control diet it was 80 gm. Prothrombin times were determined 2 weeks after the feeding of the experimental diet was started. The rats given the experimental diet at weaning did not develop a more severe vitamin K deficiency than rats given the experimental diet when somewhat older and heavier. The rats given the experimental diet at weaning had prothrombin levels of 37, 31, 13, 4, and 5 percent. Their litter

mates given the control diet for 3 weeks prior to the experimental diet had prothrombin levels of 12, 7, 15, 7, and 18 percent respectively.

Comparative effectiveness of various sulfonamides in producing a vitamin K deficiency.—Various sulfonamides were compared with respect to the severity of the vitamin K deficiency they produced and the rapidity of its production. The data in table 2 are from a representative experiment in which litter mates were observed for a 10-week period. It may be noted that the compounds fall into two groups. Sulfapyrazine, sulfadiazine, and sulfathiazole were more effective than sulfanilamide, succinyl sulfathiazole, or sulfaguanidine.[7]

TABLE 2.—*Comparative effectiveness of various sulfonamides in producing a vitamin K deficiency*

Drug	Number of rats	Lowest individual prothrombin levels[1] (percent)	Average of lowest prothrombin levels (percent)	Average of prothrombin levels after 2 weeks on experiment (percent)
Sulfapyrazine	6	4, 9, 12, 18, 29, 30	17	17
Sulfadiazine	10	5, 6, 6, 9, 10, 15, 20, 26, 28, 33	16	31
Sulfathiazole	9	6, 11, 11, 11, 17, 19, 22, 41, 42	20	53
Succinyl sulfathiazole	8	24, 40, 43, 43, 48, 61, 64, 77	50	78
Sulfanilamide	6	4, 12, 42, 77, 83, 85	51	78
Sulfaguanidine	9	21, 26, 30, 31, 40, 76, 80, 85, 100	54	90

[1] Determinations were made weekly for 10 weeks. The lowest level reached by each rat is recorded here. Litter mates were used.

Sulfapyrazine was the most potent compound studied. Of 25 rats on the sulfapyrazine-containing diet, including 19 from other experiments, 20 developed a severe hypoprothrombinemia with prothrombin levels under 20 percent. Multiple hemorrhages were observed in 18 of these 20 rats. The other 5 rats had prothrombin levels between 21 and 30 percent. These manifestations were noted after only 2 to 3 weeks on the experimental diet. Fifteen rats in the sulfapyrazine group were used in treatment experiments. Nine of the 10 untreated rats died early with massive hemorrhages and 1 rat survived with a return of its prothrombin level to normal.

Influence of the type of casein upon development of vitamin K deficiency.—It was noted during the course of these various studies that the type of the casein in the diet played a part in the rapidity of production of the vitamin K deficiency and its severity. This was investigated more carefully by comparing litter mates on sulfonamide-containing diets which differed only in regard to the type of casein (table 3). Sulfadiazine was used in one experiment and sulfaguanidine in another. The two experiments gave parallel results. Crude or

[7] Ten rats were fed the experimental diet containing 1 percent sulfamerazine. Hemorrhages and severe hypoprothrombinemia were observed in four of the rats between the second and third week. Observations were not continued beyond that time.

leached casein appeared to delay the onset of vitamin K deficiency and reduce its severity. Our leached and alcohol-extracted casein was the best of the caseins tested for use in diets designed to produce vitamin K deficiency.

An attempt was made to explain the differences in the results obtained with the leached and the leached and alcohol-extracted casein. The vitamin K activity of the material extracted from leached casein by alcohol[8] was determined by the assay procedure with hypoprothrombinemic rats described later in this report. It was found to contain about 0.05 micrograms of vitamin K (2-methyl-1,4-naphthohydroquinone diacetate) activity per gram of leached casein.

TABLE 3.—*Effect of the type of casein in the diet on the production of vitamin K deficiency*

Drug	Casein	Number of rats	Lowest individual prothrombin levels[1] (percent)	Average of lowest prothrombin levels (percent)	Average of prothrombin levels after 2 weeks on experiment (percent)
Sulfadiazine	Leached and alcohol-extracted.[3]	9	3, 5, 5, 6, 10, 11, 19, 19, 41	13	25
	Smaco	8	5, 6, 8, 8, 9, 16, 42, 47	18	38
	Crude	8	6, 16, 20, 30, 32, 36, 40, 43	28	68
Sulfaguanidine	Leached and alcohol-extracted.[3]	4	12, 16, 27, 63	30	58
	Smaco	5	17, 21, 46, 68, 69	44	77
	Labco	5	21, 26, 45, 81, 90	53	86
	Leached[2]	5	53, 55, 67, 90, 91	71	90

[1] Determinations were made weekl
the sulfaguanidine group. Groups of
prothrombin level of the control rat recei

[2] Leached for a week in daily changes of acidulated water (8).

[3] Alcohol extraction of casein was by the following procedure: 400 gms. of dried, ground, leached casein was shaken with 2,000 cc. of 60 percent ethyl alcohol by volume for 30 minutes. The casein was filtered off the next day and the process repeated. Finally, it was washed with 1,000 cc. of 60 percent alcohol, then with 500 cc. of 95 percent ethyl alcohol and dried in air. 600 gms. of this casein was boiled for 4 hours in 1,200 cc. of 95 percent ethyl alcohol and filtered. This boiling was repeated 3 times and the casein dried in air.

Lack of effect of crystalline biotin and crystalline folic acid on the production of vitamin K deficiency.—It has been reported (5) that the effect of succinyl sulfathiazole on the prothrombin time of rats can be counteracted by crystalline biotin and folic acid concentrates. This report prompted the trial of these vitamins in experiments in which sulfadiazine was used to produce a vitamin K deficiency. Crystalline biotin and crystalline folic acid, either alone or together, did not appear to produce a significant change in the development of vitamin K deficiency (table 4). It may be noted that the deficiency produced in this one experiment was not as severe as usual, possibly because of the particular batch of casein used.

[8] The alcohol filtrates were concentrated under reduced pressure and partially dried in vacuo over $CaCl_2$.

TABLE 4.—*Effect of biotin and folic acid on production of sulfadiazine vitamin K deficiency*

Supplement (oral)	Number of rats	Lowest individual prothrombin levels[1] (percent)	Average of lowest prothrombin levels (percent)
None	5	19, 28, 36, 48, 56	35
Crystalline biotin, 5 micrograms daily	4	19, 29, 53, 69	43
Crystalline folic acid, 5 micrograms daily	5	12, 16, 25, 39, 78	34
Crystalline biotin and crystalline folic acid, 5 micrograms each daily.	5	10, 26, 31, 44, 46	31

[1] Determinations were at 2, 3, and 4 weeks after start of experiment. Litter mates were used.

Further evidence was obtained that folic acid was not a determining factor in the development of vitamin K deficiency. Granulocytopenia and anemia which are produced by these various sulfon-

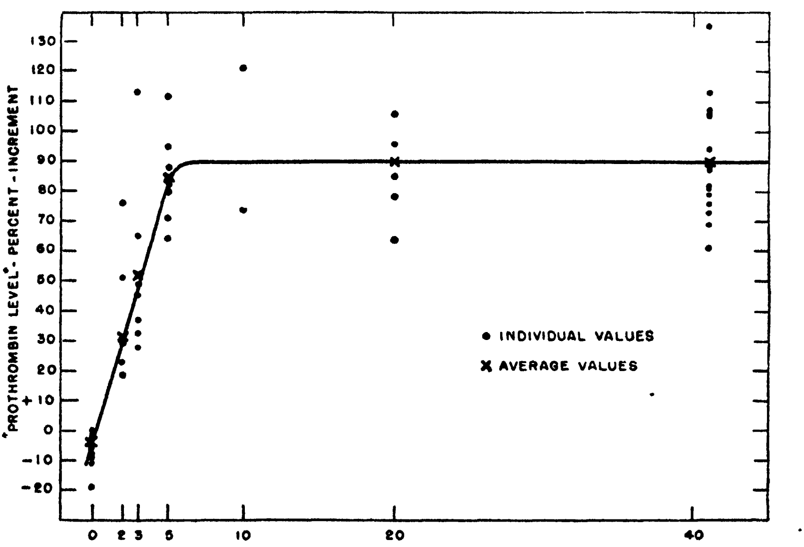


FIGURE 2.—Responses of hypoprothrombinemic rats to vitamin K (2-methyl-1,4-naphthohydroquinone diacetate).

amides (*6*, *12*) are due to a lack of folic acid (*13*). Yet no correlation was observed between the development of these blood dyscrasias and vitamin K deficiency.

*Treatment with vitamin K. *Suggested vitamin K assay method.*—Rats with hypoprothrombinemia induced by sulfapyrazine, sulfadiazine, and sulfathiazole gave uniformly rapid and consistent responses to the oral administration of 2-methyl-1,4-naphthohydroquinone diacetate (table 5, fig. 2). (The few rats with hypoprothrombinemia produced by sulfaguandine, sulfanilamide, and succinyl sulfathiazole were not treated.) The prothrombin level was found to attain a maximum by 10 hours after administration and

no further increase was observed between 10 and 24 hours. The responses were independent of the rapidity with which the hypoprothrombinemia was produced and the sulfonamide which produced it. Five micrograms was the least amount which regularly gave a complete response. Doses of 2 and 3 micrograms resulted in partial responses. Although spontaneous remissions have been noted, no evidence has been obtained to indicate that the recovery of untreated rats is ever abrupt. In general, when no treatment was given a repetition of the determination in 24 hours showed no change or a further decline in prothrombin level. A similar result was obtained when vitamin K-free substances were administered. A mixture of p-aminobenzoic acid (15 mg.), ascorbic acid (30 mg.), and crystalline biotin (30 micrograms) was given orally to 2 rats with prothrombin levels of 7 percent and 27 percent; the values were 5 percent and 22 percent, respectively, 24 hours later. A folic acid concentrate from liver was given to 3 rats with prothrombin levels of 6 percent, 7 percent, and 9 percent; the values were 5 percent for each of them after 24 hours.

TABLE 5.—*Responses of hypoprothrombinemic rats to vitamin K* [1]

Amount of vitamin K given orally (micrograms)	Number of rats	Prothrombin levels before and after treatment (percent)	Average of prothrombin levels before and after treatment (percent)	Interval between treatment and final determination (hours)
40	15	Before treatment: 4, 5, 5, 5, 6, 6, 8, 9, 10, 11, 11, 11, 13, 19, 24, After treatment: 80, 94, 74, 78, 112, 111, 96, 103, 145, 124, 92, 118, 74, 101, 103	10 100	24
20	5	Before treatment: 6, 6, 8, 10, 16 After treatment: 91, 112, 86, 74, 112	9 95	12
10	2	Before treatment: 4, 12 After treatment: 125, 86		17
5	8	Before treatment: 3, 5, 5, 6, 8, 9, 9, 11 After treatment: 67, 100, 117, 89, 92, 89, 80, 97	7 91	10
3	7	Before treatment: 7, 8, 8, 9, 9, 16, 17 After treatment: 72, 45, 121, 54, 58, 49, 45	11 63	10
2	5	Before treatment: 3, 5, 6, 20, 28 After treatment: 26, 36, 82, 71, 47	12 44	24
[2] 0	11	Before treatment: 6, 8, 15, 18, 20, 22, 25, 25, 26, 26, 27 After treatment: 7, 8, 11, 6, 17, 13, 20, 19, 7, 18, 25	20 14	24

[1] 2-methyl-1, 4-naphthohydroquinone diacetate.
[2] No treatment given.

Following treatment with 5 to 40 micrograms and a full therapeutic response to vitamin K, 27 of the rats were maintained on the sulfonamide diet and prothrombin determinations were made at weekly intervals. When 4 weeks after original treatment had elapsed, 11 rats had developed a severe hypoprothrombinemia again, 3 retained

normal levels, 8 died, and 5 showed mild hypoprothrombinemia. The interval between treatment and relapse was as follows:

Treatment dose (micrograms vitamin K)	*Interval between treatment and relapse (days)*
40	7, 19, 21, 21, 27, 27.
20	16.
10	7, 7.
5	7, 7.

Assay of vitamin K activity of crude substances by the use of rats made hypoprothrombinemic by sulfonamides is based on the specific and fairly uniform responses of such rats to pure vitamin K (table 5, fig. 2). The substance to be tested is administered orally to a rat whose prothrombin level is less than 30 percent. Determination of the prothrombin level is repeated 18 to 24 hours later. "Increases" over the pretreatment prothrombin levels of 60 percent or more, of 20 to 60 percent, and of less than 20 percent are considered to represent the following respective degrees of vitamin K (2-methyl-1, 4-naphthohydroquinone diacetate) activity: 5 micrograms or greater, 2 to 4 micrograms, and less than 2 micrograms. By testing the unknown substance at more than one level the accuracy of the results may be increased.

DISCUSSION

By the choice of the proper sulfonamide, it has been found possible to produce, rapidly and consistently, a vitamin K deficiency so severe that it could be demonstrated by relatively crude means. There was a marked prolongation of the clotting time of whole blood which occurs only in extreme hypoprothrombinemia. Multiple, massive hemorrhages were common. Severe degrees of vitamin K deficiency appeared in 2 to 3 weeks in over 80 percent of the animals which received sulfapyrazine, sulfadiazine, or sulfathiazole.

Relatively mild symptoms of vitamin K deficiency were produced by sulfaguanidine, sulfanilamide, and succinyl sulfathiazole comparable to those previously reported by other workers (*4*, *5*). It appears, therefore, that sulfapyrazine, sulfadiazine, and sulfathiazole are considerably more effective than sulfaguanidine, sulfanilamide, or succinyl sulfathiazole. A consideration of the rapidity of production of vitamin K deficiency as well as its severity indicates further that sulfapyrazine is more effective than sulfadiazine or sulfathiazole. As shown in table 2, prothrombin levels averaging under 20 percent were produced by sulfapyrazine in 2 weeks while it was necessary to administer sulfadiazine and sulfathiazole for longer periods of time in order to obtain equally low average prothrombin levels.

Rats with sulfonamide-induced hypoprothrombinemia gave uniformly rapid and consistent responses to the oral administration of 2-methyl-1,4-naphthohydroquinone diacetate (table 5, fig. 2). It

appeared to make no difference, in respect to the response, which sulfonamide produced the hypoprothrombinemia. Five micrograms or more of the diacetate uniformly restored the prothrombin levels to normal values. Two or 3 micrograms gave partial responses. The responses to 3 micrograms averaged somewhat better than to 2. This is the basis of the assay method which is described under "Results."

Welch and Wright (*5*) reported that supplements of a "folic acid" concentrate and crystalline biotin antagonized the increased prothrombin time produced by succinyl sulfathiazole in purified diets. Black et al. (*4*) noted an antagonism by a liver factor of a sulfaguanidine-induced hypoprothrombinemia. In the present study, folic acid and biotin appear to have no effect on the sulfadiazine-induced vitamin K deficiency.

The type of casein in the diet was found to be an important factor in the production of vitamin K deficiency. This was shown to be related, to some extent at least, to the vitamin K content of the casein.

We have observed spontaneous remissions in hypoprothrombinemic rats. Alterations in intestinal vitamin K synthesis might account for some of these remissions.

The gross and microscopic lesions observed in the rats included in these various studies have been reported previously (*7*). Except for hemorrhages, no differences were noted between hypoprothrombinemic rats and experimental rats with normal prothrombin levels. The low incidence of liver lesions and their relative mildness make it appear doubtful that the hypoprothrombinemia produced in these rats by ingestion of sulfonamide diets is a result of such lesions.

Rats subjected to bile duct obstruction or given diets containing petrolagar have a defective alimentary absorption of vitamin K. This absorptive inadequacy is considered to be the basis for the vitamin K deficiency produced in these rats. It is of interest to compare observations made on such rats (*14, 15*) with our data on rats with sulfonamide-induced vitamin K deficiency. This comparison suggests that in rats ingesting sulfonamide-containing diets, vitamin K is efficiently absorbed and utilized and that the requirements for this vitamin have not been increased.

The minimal curative dose of vitamin K given orally to rats made hypoprothrombinemic by sulfonamides was probably no larger than that given parenterally to rats with vitamin K deficiency induced by bile duct obstruction (*14, 15*) or petrolagar diets (*15*). This makes it likely that in the sulfonamide rats there was no serious interference with absorption of vitamin K. Furthermore, the fact that the response to treatment was complete within 10 hours suggests the rapid as well as efficient utilization of the orally administered vitamin K in sulfonamide rats. Observations were made also of the time inter-

val between the correction of a vitamin K deficiency and a relapse to hypoprothrombinemic levels. This time period was approximately the same in rats on a sulfonamide regime as in rats with bile duct obstruction or in rats ingesting a petrolagar diet (*15*). This makes it doubtful that the requirements for vitamin K in sulfonamide rats are significantly increased.

The order of effectiveness of sulfonamides in producing a vitamin K deficiency as demonstrated in the present studies is very similar to the order of drug activity as reported by White (*16*) in relation to bacteriostasis of coliform organisms in the intestines of mice. The vitamin K synthesis by *B. coli* in vitro has been shown to exceed by far that of a number of other intestinal bacteria which were tested (*17*). Although these data are drawn from different sources, the parallelism between the effectiveness of these sulfonamides in producing a vitamin K deficiency and their bacteriostatic potency against a known synthesizer of vitamin K is striking.

SUMMARY

Sulfapyrazine, sulfadiazine, or sulfathiazole fed to rats at a 1-percent level in purified diets resulted in a regular prodution of severe hypropothrombinemia and hemorrhage in 2 to 3 weeks. Sulfaguanidine, sulfanilamide, and succinyl sulfathiazole were much less effective.

Vitamin K, orally, prevented this hypoprothrombinemic and hemorrhagic state.

Crystalline biotin and crystalline folic acid, alone or combined, did not influence the production of vitamin K deficiency by sulfadiazine.

The type of dietary casein may be important in the development of vitamin K deficiency. Alcoholic extracts of leached casein showed vitamin K activity.

Rats made severely hypoprothrombinemic with a sulfonamide gave uniform and consistent responses to orally administered vitamin K.

A method for assay of the vitamin K activity of crude substances is suggested.

REFERENCES

(*1*) Dam, H., and Glavind, J.: Alimentary K-avitaminosis in rats. Zeitschrift f. Vitaminforschung, **9**: 71–74 (1939).

(*2*) Greaves, J. D.: Studies on the vitamin K requirements of the rat. Am. J. Physiol., **125**: 429–436 (1939).

(*3*) Daft, F. S., Ashburn, L. L., and Sebrell, W. H.: Biotin deficiency and other changes in rats given sulfanilylguanidine and succinyl sulfathiazole in purified diets. Science, **98**: 321–322 (1942).

(*4*) Black, S., Overman, R. S., Elvehjem, C. A., and Link, K. P.: The effect of sulfaguanidine on rat growth and plasma prothrombin. J. Biol. Chem., **145**: 137–143 (1942).

(*5*) Welch, A. D., and Wright, L. D.: The role of "folic acid" and biotin in the nutrition of the rat. J. Nutrit., **25**: 555–570 (1943).

(6) Spicer, S. S., Daft, F. S., Sebrell, W. H., and Ashburn, L. L.: Prevention and treatment of agranulocytosis and leukopenia in rats given sulfanilylguanidine or succinyl sulfathiazole in purified diets. Pub. Health Rep., **57**: 1559–1566 (1942).
(7) Endicott, K. M., Kornberg, A., and Daft, F. S.: Lesions in rats given sulfathiazole, sulfadiazine, sulfanilamide, sulfamerazine, sulfapyrazine, or acetylsulfadiazine in purified diets. Pub. Health Rep., **59**: 49–54 (1944).
(8) McCollum, E. V., Simmonds, N., Shipley, P. G., and Park, E. A.: Studies on experimental rickets. XXII. Conditions which must be fulfilled in preparing animals for testing the antirachitic effects of individual foodstuffs. Bull. Johns Hopkins Hosp., **33**: 296–302 (1922).
(9) Ziffren, S. E., Owen, C. A., Hoffman, G. L., and Smith, H. P.: A simple bedside test for control of vitamin K therapy. Am. J. Clin. Path. Tech. Supp., **4**: 13–16 (1940).
(10) Ansbacher, S., Fernholz, E., and Dolliver, M. A.: Vitamin K-active derivatives of 2-methyl-1,4-naphthohydroquinone. J. Am. Chem. Soc., **62**: 155–158 (1940).
(11) Stokstad, E. L. R.: Some properties of a growth factor for *Lactobacillus casei*. J. Biol. Chem., **149**: 573–574 (1943).
(12) Kornberg, A., Daft, F. S. and Sebrell, W. H.: Production and treatment of granulocytopenia and anemia in rats fed sulfonamides in purified diets. Science, **98**: 20–22 (1943).
(13) Daft, F. S., and Sebrell, W. H.: The successful treatment of granulocytopenia and leucopenia in rats with crystalline folic acid. Pub. Health Rep., **58**: 1542–1545 (1943).
(14) Flynn, J. E., and Warner, E. D.: Prothrombin levels and synthetic vitamin K in obstructive jaundice of rats. Proc. Soc. Exp. Biol. and Med., **43**: 190–194 (1940).
(15) Smith, J. J., Ivy, A. C., and Foster, R. H. K.: The pharmacology of two water-soluble vitamin K-like substances. J. Lab. and Clin. Med., **28**: 1667–1680 (1943).
(16) White, H. J.: Comparative activity of sulfonamides against coliform bacteria in the intestines of mice. Bull. Johns Hopkins Hosp., **71**: 213–234 (1942).
(17) Orla-Jensen, S., Orla-Jensen, A. D., Dam, H., and Glavind, J.: The formation of vitamin K by some intestinal bacteria. Zentr. Bakt. Parasitenk, Abt. II, **104**: 202–204 (1941); Chem. Zentr., **1**: 1155 (1942).

DEATHS DURING WEEK ENDED JUNE 17, 1944

[From the Weekly Mortality Index, issued by the Bureau of the Census, Department of Commerce]

	Week ended June 17, 1944	Corresponding week, 1943
Data for 93 large cities of the United States:		
Total deaths	8,290	8,483
Average for 3 prior years	8,049	
Total deaths, first 24 weeks of year	230,412	235,373
Deaths under 1 year of age	646	595
Average for 3 prior years	563	
Deaths under 1 year of age, first 24 weeks of year	15,042	16,362
Data from industrial insurance companies:		
Policies in force	66,618,078	65,545,543
Number of death claims	12,459	12,646
Death claims per 1,000 policies in force, annual rate	9.8	10.1
Death claims per 1,000 policies, first 24 weeks of year, annual rate	10.6	10.4

PREVALENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED JUNE 24, 1944

Summary

A total of 126 cases of poliomyelitis was reported during the current week, as compared with 71 last week and 136 for the corresponding week last year. Of the current cases, 59 occurred in North Carolina and Kentucky (42 and 17, respectively). Of the 136 cases reported for the same week last year, 58 cases occurred in California and 39 in Texas, or 70 percent in these two States. The cumulative total to date this year is 822, as compared with 894 for the same period last year and a 5-year median of 697 for the period.

Of the other 8 diseases for which comparative figures are available for the preceding 5 years, the incidence of only meningococcus meningitis and scarlet fever is above the respective 5-year median.

A new low has been recorded for smallpox. A total of 263 cases has been reported to date this year, as compared with 568 for the same period last year, and 554 in 1942, which is the lowest figure previously reported for the corresponding period. Only 4 cases were reported during the current week—3 in Wisconsin and 1 in Texas.

Although the incidence of typhoid fever to date is about 20 percent above that for the same period last year, it is slightly below the median of the past five years. The cumulative total this year to date is 2,004 cases, as compared with 1,666 for corresponding period last year.

Of 97 cases of endemic typhus fever reported during the current week, 37 cases occurred in Texas, 20 in Georgia, and 16 in Alabama. The total to date is 1,295 cases, as compared with 1,204 last year.

Since January, the mortality in 93 large cities has been slightly above the 3-year (1941–43) average for most of the weeks. For the current week, however, the figure is slightly below the 3-year average—8,556 and 8,601, respectively. The cumulative total to date is 238,969, as compared with 244,474 for the same period last year.

Telegraphic morbidity reports from State health officers for the week ended 1944, and comparison with corresponding week of 1943 and 5-year median

In these tables a zero indicates a definite report, while leaders imply that, although none was reported, cases may have occurred.

Division and State	Diphtheria			Influenza			Measles			Meningitis, meningococcus		
	Week ended		Median 1939–43	Week ended		Median 1939–43	Week ended		Median 1939–43	Week ended		Median 1939–43
	June 24, 1944	June 26, 1943		June 24, 1944	June 26, 1943		June 24, 1944	June 26, 1943		June 24, 1944	June 26, 1943	
NEW ENGLAND												
Maine	0	0	0	----	----	----	69	125	125	0	7	0
New Hampshire	1	1	0	----	----	----	17	7	7	0	2	0
Vermont	0	0	0	----	----	----	19	154	131	0	0	0
Massachusetts	1	3	3	----	----	----	548	1,009	759	9	18	4
Rhode Island	0	0	1		----	----	5	97	97	1	5	0
Connecticut	1	3	1	----	1	1	138	200	227	1	7	0
MIDDLE ATLANTIC												
New York	14	15	13	[1]	4	4	638	2,548	1,146	27	45	6
New Jersey	2	4	4	1	4	3	432	1,452	933	11	16	1
Pennsylvania	8	12	9	1	----	----	244	553	463	15	21	6
EAST NORTH CENTRAL												
Ohio	2	5	5	1	1	8	93	357	182	15	12	1
Indiana	0	4	3	2	1	1	30	146	63	3	9	1
Illinois	7	7	17	----	14	14	134	926	217	17	19	1
Michigan [3]	9	9	4	1	4	1	345	1,611	508	10	23	0
Wisconsin	1	0	0	8	9	12	823	1,665	954	4	6	0
WEST NORTH CENTRAL												
Minnesota	9	2	1	----	----	----	117	272	91	2	2	1
Iowa	0	0	1	----	----	----	81	85	126	0	0	0
Missouri	2	2	1	----	----	----	39	99	65	14	17	0
North Dakota	1	1	1	----	36	4	13	68	11	0	1	0
South Dakota	3	0	0	----	----	----	5	50	7	0	0	0
Nebraska	2	1	1	----	----	----	39	97	52	0	1	0
Kansas	0	1	3	2	4	1	63	126	126	2	2	0
SOUTH ATLANTIC												
Delaware	0	0	0	----	----	----	1	19	9	0	1	0
Maryland [2]	5	3	3	4	1	2	74	155	79	1	4	3
District of Columbia	5	0	0	----	----	----	46	60	60	3	2	1
Virginia	3	1	5	66	18	18	115	112	138	9	10	3
West Virginia	1	1	8	3	----	3	68	23	23	0	0	1
North Carolina	10	4	4	----	8	----	184	76	120	7	13	1
South Carolina	7	1	1	62	80	108	80	40	29	3	2	1
Georgia	2	2	4	3	12	13	29	26	42	2	3	1
Florida	2	0	2	6	6	6	64	33	45	7	5	0
EAST SOUTH CENTRAL												
Kentucky	2	3	8	1	2	2	16	42	42	3	3	1
Tennessee	2	5	3	8	6	10	21	66	50	3	4	0
Alabama	2	3	8	15	15	12	48	78	72	9	11	2
Mississippi [2]	1	2	1	----	----	----	----	----	----	4	0	1
WEST SOUTH CENTRAL												
Arkansas	3	3	3	8	1	8	63	22	22	1	4	1
Louisiana	2	3	3	1	1	5	42	13	13	7	1	1
Oklahoma	1	0	1	4	16	7	82	67	60	1	0	0
Texas	21	24	23	162	189	80	642	228	228	5	12	1
MOUNTAIN												
Montana	0	0	1	1	----	----	18	121	72	1	0	0
Idaho	0	0	0	----	5	----	5	74	35	2	6	0
Wyoming	0	0	1	----	7	2	25	49	18	2	0	0
Colorado	5	5	7	12	27	12	50	64	69	2	4	0
New Mexico	3	2	1	5	1	----	17	6	11	1	1	0
Arizona	0	2	2	26	44	31	35	20	34	0	0	0
Utah [3]	0	0	0	1	12	1	43	98	98	0	3	0
Nevada	4	0	0	----	----	----	9	1	0	0	0	0
PACIFIC												
Washington	6	5	0	1	1	----	123	130	141	4	6	0
Oregon	4	2	1	6	2	3	54	59	80	0	3	3
California	19	19	15	9	77	56	1,710	693	693	11	24	3
Total	168	160	196	420	609	451	7,556	14,022	8,695	219	335	45
25 weeks	5,396	5,983	6,394	334,931	76,886	149,068	570,515	499,064	444,331	11,6[illegible]	11,766	1,175

See footnotes at end of table.

Telegraphic morbidity reports from State health officers for the week ended June 24, 1944, and comparison with corresponding week of 1943 and 5-year median—Con.

Division and State	Poliomyelitis: Week ended— June 24, 1944	Poliomyelitis: Week ended— June 26, 1943	Poliomyelitis: Median 1939–43	Scarlet fever: Week ended— June 24, 1944	Scarlet fever: Week ended— June 26, 1943	Scarlet fever: Median 1939–43	Smallpox: Week ended— June 24, 1944	Smallpox: Week ended— June 26, 1943	Smallpox: Median 1939–43	Typhoid and paratyphoid fever[3]: Week ended— June 24, 1944	Typhoid and paratyphoid fever[3]: Week ended— June 26, 1943	Typhoid and paratyphoid fever[3]: Median 1939–43
NEW ENGLAND												
Maine	0	0	0	16	14	7	0	0	0	1	0	0
New Hampshire	0	0	0	1	2	2	0	0	0	0	0	0
Vermont	0	0	0	6	6	2	0	0	0	0	0	0
Massachusetts	0	0	0	164	256	135	0	0	0	3	3	3
Rhode Island	0	0	0	7	25	5	0	0	0	0	0	1
Connecticut	1	3	0	25	44	29	0	0	0	1	1	1
MIDDLE ATLANTIC												
New York	9	6	1	219	189	217	0	0	0	2	7	10
New Jersey	1	1	0	71	35	70	0	0	0	1	1	2
Pennsylvania	2	1	1	141	85	163	0	0	0	2	4	7
EAST NORTH CENTRAL												
Ohio	7	1	1	97	62	101	0	0	0	3	7	5
Indiana	1	0	0	20	18	23	0	0	0	0	1	4
Illinois	5	0	2	75	87	156	0	0	5	4	4	4
Michigan[2]	2	0	2	158	52	148	0	0	0	1	12	3
Wisconsin	0	0	0	104	136	67	3	0	0	1	1	1
WEST NORTH CENTRAL												
Minnesota	4	0	1	52	19	20	0	0	0	0	0	0
Iowa	0	0	0	27	15	15	0	0	2	0	0	2
Missouri	0	1	1	22	14	14	0	0	0	2	0	1
North Dakota	0	0	0	10	5	6	0	0	0	0	0	0
South Dakota	0	0	0	6	3	4	0	0	0	0	0	0
Nebraska	0	0	0	13	5	8	0	0	0	0	0	0
Kansas	1	0	0	9	21	18	0	1	0	3	0	1
SOUTH ATLANTIC												
Delaware	0	0	0	2	1	4	0	0	0	0	1	1
Maryland[3]	0	0	0	58	27	22	0	0	0	2	2	1
District of Columbia	0	0	0	17	2	6	0	0	0	0	0	0
Virginia	4	1	1	23	10	7	0	0	0	2	5	5
West Virginia	0	0	0	26	11	13	0	0	0	2	4	4
North Carolina	42	0	1	11	11	11	0	0	0	6	1	5
South Carolina	2	1	1	12	1	1	0	0	0	4	1	4
Georgia	1	0	1	7	7	6	0	0	0	5	13	15
Florida	1	0	1	6	1	1	0	0	0	2	2	2
EAST SOUTH CENTRAL												
Kentucky	17	1	1	15	11	17	0	4	3	3	3	7
Tennessee	0	1	1	19	7	14	0	0	0	2	0	6
Alabama	3	2	2	3	3	4	0	0	0	2	2	3
Mississippi[3]	2	0	0	5	3	3	0	0	0	6	5	3
WEST SOUTH CENTRAL												
Arkansas	2	2	2	0	1	2	0	0	1	2	3	6
Louisiana	7	2	1	4	1	5	0	0	0	6	9	11
Oklahoma	2	8	1	3	9	7	0	0	0	3	2	5
Texas	4	39	3	23	28	18	1	0	0	16	18	21
MOUNTAIN												
Montana	0	0	0	13	2	6	0	0	0	1	0	1
Idaho	0	0	0	6	60	4	0	0	0	0	0	1
Wyoming	0	0	0	4	6	3	0	0	0	0	0	0
Colorado	2	0	0	31	24	17	0	0	2	2	3	3
New Mexico	0	2	0	7	2	4	0	0	0	1	0	1
Arizona	0	6	3	12	13	3	0	0	0	4	0	1
Utah[3]	1	0	0	16	13	5	0	0	0	0	0	0
Nevada	0	0	0	0	0	0	0	0	0	0	0	0
PACIFIC												
Washington	0	0	0	71	23	19	0	1	0	0	2	2
Oregon	0	0	0	35	10	7	0	2	2	1	1	1
California	3	58	14	164	129	107	0	0	1	8	6	6
Total	126	136	69	1,836	1,509	1,578	4	8	19	104	124	155
25 weeks	822	894	697	139,920	91,042	91,042	263	568	1,081	2,004	1,666	2,258

See footnotes at end of table.

Telegraphic morbidity reports from State health officers for the week ended June 24, 1944, and comparison with corresponding week of 1943 and 5-year median

Division and State	Whooping cough			Week ended June 24, 1944								
	Week ended		Median 1939-43	Anthrax	Dysentery			Encephalitis, infectious	Leprosy	Rocky Mt. spotted fever	Tularemia	Typhus fever
	June 24, 1944	June 26, 1943			Amebic	Bacillary	Unspecified					
NEW ENGLAND												
Maine	14	6	22	0	0	0	0	0	0	0	0	0
New Hampshire	0	4	4	0	0	0	0	0	0	0	0	0
Vermont	18	12	21	0	0	0	0	0	0	0	0	0
Massachusetts	58	96	144	0	0	0	0	0	0	0	0	0
Rhode Island	3	34	20	0	0	0	0	0	0	0	0	0
Connecticut	24	21	54	0	0	0	0	0	0	0	0	0
MIDDLE ATLANTIC												
New York	110	245	300	0	0	7	0	2	0	3	0	2
New Jersey	46	181	181	1	1	0	0	0	0	1	0	0
Pennsylvania	80	277	277	2	1	0	0	0	0	1	0	0
EAST NORTH CENTRAL												
Ohio	83	168	173	0	0	0	0	1	0	0	0	0
Indiana	12	60	43	0	0	0	0	0	0	0	0	0
Illinois	71	156	156	0	1	0	0	1	0	0	0	0
Michigan [2]	64	249	173	0	0	4	0	0	0	0	0	0
Wisconsin	62	225	169	0	0	0	0	0	0	0	0	0
WEST NORTH CENTRAL												
Minnesota	25	48	39	0	5	0	0	0	0	0	0	0
Iowa	8	59	28	0	0	0	0	0	0	0	0	0
Missouri	20	36	28	0	0	0	1	0	0	0	0	0
North Dakota	13	7	13	0	0	0	0	0	0	0	0	0
South Dakota	19	5	1	0	0	0	0	0	0	0	0	0
Nebraska	34	11	11	0	0	0	0	0	0	0	0	0
Kansas	29	88	56	0	0	0	0	0	0	0	0	0
SOUTH ATLANTIC												
Delaware	0	12	7	0	0	0	0	0	0	0	0	0
Maryland [2]	90	148	75	0	0	0	1	0	0	9	0	1
District of Columbia	1	38	28	0	0	0	0	0	0	0	0	0
Virginia	111	190	103	0	0	0	250	0	0	4	1	0
West Virginia	7	86	33	0	0	0	0	0	0	0	0	0
North Carolina	184	273	155	0	0	0	0	0	0	6	2	3
South Carolina	41	70	70	0	0	37	0	0	0	0	0	1
Georgia	13	37	37	0	1	12	67	0	0	1	0	20
Florida	10	23	13	0	2	3	0	0	0	0	0	6
EAST SOUTH CENTRAL												
Kentucky	103	80	52	0	0	12	0	0	0	3	0	0
Tennessee	34	62	62	0	0	0	6	0	0	0	0	0
Alabama	48	96	40	0	0	0	0	1	0	0	0	16
Mississippi [2]	-----	-----	-----	0	0	0	0	0	0	0	1	7
WEST SOUTH CENTRAL												
Arkansas	16	31	31	0	0	10	0	0	0	0	5	0
Louisiana	1	13	16	0	0	6	0	0	0	0	0	4
Oklahoma	1	68	16	0	0	0	0	0	0	0	0	0
Texas	215	566	359	0	38	443	0	2	0	0	1	37
MOUNTAIN												
Montana	9	54	15	0	0	0	0	0	0	0	1	0
Idaho	9	1	7	0	0	0	0	0	0	0	0	0
Wyoming	15	0	3	0	0	0	0	0	0	3	1	0
Colorado	21	42	42	0	0	0	0	0	0	2	0	0
New Mexico	4	13	17	0	0	0	1	0	0	0	0	0
Arizona	13	27	27	0	0	0	45	0	0	0	0	0
Utah [2]	76	67	67	0	0	0	0	0	0	1	0	0
Nevada	0	0	0	0	0	0	0	0	0	0	0	0
PACIFIC												
Washington	10	53	53	0	0	0	0	0	0	0	0	0
Oregon	9	49	30	0	0	0	0	0	0	0	0	0
California	82	282	282	0	5	14	0	2	0	0	0	0
Total	1,916	4,369	3,862	3	54	548	371	9	0	34	12	97
25 weeks	45,334	101,969	98,028	22	676	8,033	2,493	274	15	144	280	1,295
25 weeks, 1943	-----	-----	-----	34	917	5,718	1,552	274	13	160	465	1,204

[1] New York City only.
[2] Period ended earlier than Saturday.
[3] Including paratyphoid fever cases reported separately as follows: Massachusetts 3, Illinois 1, Michigan 1, Georgia 2, Kentucky 1, Texas 1, California 1.

WEEKLY REPORTS FROM CITIES

City reports for week ended June 10, 1944

This table lists the reports from 89 cities of more than 10,000 population distributed throughout the United States, and represents a cross section of the current urban incidence of the diseases included in the table.

	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
NEW ENGLAND												
Maine:												
Portland	0	0		0	50	0	2	0	11	0	0	1
New Hampshire:												
Concord	0	0		0	8	0	0	0	0	0	0	0
Vermont:												
Barre	0	0		0	0	0	0	0	0	0	0	0
Massachusetts:												
Boston	2	1		0	123	9	8	0	49	0	0	2
Fall River	0	0		0	22	0	1	0	1	0	0	0
Springfield	0	0		0	24	1	0	0	12	0	0	8
Worcester	0	0		0	7	0	2	0	26	0	1	7
Rhode Island:												
Providence	0	0		0	5	2	1	0	5	0	0	11
Connecticut:												
Bridgeport	0	0		0	4	1	0	0	0	0	0	1
Hartford	1	0		0	9	0	2	0	12	0	0	5
New Haven	0	0		0	15	0	1	0	0	0	0	0
MIDDLE ATLANTIC												
New York:												
Buffalo	0	0		1	9	2	2	0	6	0	0	0
New York	6	1		0	350	20	58	3	163	0	5	43
Rochester	0	0		0	45	0	2	0	7	0	1	7
Syracuse	0	0		0	2	2	0	0	1	0	0	3
New Jersey:												
Camden	0	0		0	3	0	1	0	6	0	0	0
Newark	0	0	1	0	103	1	3	0	23	0	0	5
Trenton	0	0		0	0	1	5	0	2	0	0	3
Pennsylvania:												
Philadelphia	1	0	4	0	44	11	12	0	55	0	1	6
Pittsburgh	0	0	2	2	4	3	7	2	11	0	0	3
Reading	0	0		0	0	2	2	0	1	0	0	1
EAST NORTH CENTRAL												
Ohio:												
Cincinnati	1	0		1	33	6	3	0	11	0	0	5
Cleveland	0	0		0	19	3	5	1	48	0	0	7
Columbus	0	0	1	1	8	1	2	0	4	0	0	3
Indiana:												
Fort Wayne	0	0		0	0	0	0	0	1	0	0	0
Indianapolis	2	0		0	21	2	3	0	32	0	0	12
South Bend	0	0		0	3	0	0	0	0	0	0	2
Terre Haute	0	0		0	4	0	0	0	0	0	0	3
Illinois:												
Chicago	3	0		0	133	9	20	0	52	0	1	13
Michigan:												
Detroit	9	0		0	117	7	5	1	67	0	1	31
Flint	0	0		0	3	0	2	0	10	0	0	9
Grand Rapids	0	0		0	2	0	0	0	4	0	0	2
Wisconsin:												
Kenosha	0	0		0	124	0	0	0	0	0	0	5
Milwaukee	0	0		0	219	4	2	0	24	0	0	17
Racine	0	0		0	166	0	2	0	0	0	0	8
Superior	0	0		0	6	0	0	0	9	0	0	0
WEST NORTH CENTRAL												
Minnesota:												
Duluth	0	0		0	180	0	0	0	7	0	0	1
Minneapolis	0	0		0	79	2	0	0	15	0	1	6
St. Paul	0	0		0	33	3	10	0	25	0	0	2
Missouri:												
Kansas City	0	0		1	18	3	4	0	7	0	0	0
St. Joseph	0	0		0	0	0	0	0	3	0	0	0
St. Louis	0	0		0	9	5	4	0	13	0	0	3
North Dakota:												
Fargo	0	0		0	1	0	0	0	0	0	0	9

City reports for week ended June 10, 1944—Continued

	Diphtheria cases	Encephalitis, infectious, cases	Influenza Cases	Influenza Deaths	Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
WEST NORTH CENTRAL—continued												
Nebraska:												
Omaha	1	0	------	0	8	0	3	0	4	0	0	0
Kansas:												
Topeka	0	0	------	0	13	0	0	0	5	0	0	0
Wichita	0	0	------	0	5	0	2	0	1	0	0	0
SOUTH ATLANTIC												
Delaware:												
Wilmington	0	0	------	0	0	0	1	0	1	0	0	0
Maryland:												
Baltimore	5	0	------	0	76	2	9	0	33	0	0	38
Cumberland	0	0	------	0	0	0	0	0	0	0	0	0
Frederick	0	0	------	0	0	0	0	0	0	0	0	0
District of Columbia:												
Washington	1	0	------	0	60	2	7	0	32	0	1	1
Virginia:												
Lynchburg	0	0	------	0	1	0	1	0	6	0	0	0
Richmond	0	0	------	0	1	0	1	0	1	0	0	3
Roanoke	0	0	------	0	3	0	0	0	1	0	0	2
West Virginia:												
Charleston	0	0	------	0	0	0	0	0	2	0	0	0
Wheeling	0	0	------	0	47	0	0	0	0	0	0	1
North Carolina:												
Raleigh	0	0	------	0	18	0	0	0	0	0	0	0
Wilmington	0	0	------	0	11	0	2	0	0	0	0	10
Winston-Salem	1	0	------	0	[illegible]	0	0	0	0	0	0	0
South Carolina:												
Charleston	0	0	------	0	0	0	0	0	0	0	0	3
Georgia:												
Atlanta	1	0	1	1	9	0	2	0	1	0	0	0
Brunswick	0	0	------	0	1	0	2	0	0	0	0	0
Savannah	0	0	1	1	0	0	1	0	0	0	0	0
Florida:												
Tampa	0	0	2	0	10	1	1	0	0	0	1	4
EAST SOUTH CENTRAL												
Tennessee:												
Memphis	0	0	------	0	9	1	1	1	3	0	1	3
Nashville	0	0	------	0	13	0	2	0	1	0	0	2
Alabama:												
Birmingham	0	0	------	1	3	0	3	0	2	0	0	0
Mobile	0	0	------	1	0	0	2	0	1	0	0	0
WEST SOUTH CENTRAL												
Arkansas:												
Little Rock	0	0	------	0	2	0	0	0	0	0	0	0
Louisiana:												
New Orleans	1	0	4	1	6	2	5	3	0	0	0	2
Shreveport	0	0	------	0	2	0	5	0	0	0	0	0
Texas:												
Dallas	1	0	1	1	11	0	0	0	3	0	0	8
Galveston	0	0	------	0	0	0	2	0	2	0	0	0
Houston	0	0	------	0	1	0	4	0	3	0	1	3
San Antonio	0	0	1	1	0	0	2	0	0	0	0	1
MOUNTAIN												
Montana:												
Billings	0	0	------	0	8	0	0	0	2	0	0	1
Great Falls	0	0	------	0	1	0	2	0	4	0	0	1
Helena	0	0	------	0	1	0	0	0	0	0	0	0
Missoula	0	0	------	0	13	0	2	0	1	0	0	0
Idaho:												
Boise	0	0	------	0	0	0	0	0	0	0	0	0
Colorado:												
Denver	4	0	------	0	29	1	7	0	13	0	0	5
Pueblo	0	0	------	0	0	0	1	0	0	0	0	0
Utah:												
Salt Lake City	0	0	------	0	25	1	0	0	26	0	0	8

City reports for week ended June 10, 1944—Continued

	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
PACIFIC												
Washington:												
Seattle	0	0	------	0	56	0	4	0	18	0	0	1
Spokane	0	0	------	0	19	0	2	0	15	0	0	0
Tacoma	0	0	------	0	28	1	1	0	11	0	0	1
California:												
Los Angeles	6	0	3	0	265	6	2	0	35	0	0	5
Sacramento	0	0	------	0	34	0	2	0	9	0	0	3
San Francisco	1	0	1	1	224	5	10	0	45	0	0	5
Total	47	2	22	14	3,024	122	262	11	1,004	0	15	346
Corresponding week, 1943	53	------	52	16	6,316	------	340	------	864	1	17	1,304
Average, 1939-43	64	------	45	[1] 14	[2] 4,360	------	[1] 281	------	963	4	24	1,194

[1] 3-year average, 1941-43.
[2] 5-year median.

Dysentery, amebic.—Cases: Tampa 1.
Dysentery, bacillary.—Cases: St. Louis, 2; Charleston, S. C., 8; Nashville, 1; Los Angeles, 12.
Dysentery, unspecified.—Cases: Shreveport, 1; San Antonio, 17.
Leprosy.—Cases: San Francisco, 1.
Rocky Mountain spotted fever.—Cases: Richmond, 1.
Typhus fever, endemic.—Cases: Tampa, 1; Mobile, 1; Houston, 1.

Rates (annual basis) per 100,000 population, by geographic groups, for the 89 cities in the preceding table (estimated population, 1943, 34,322,300)

	Diphtheria case rates	Encephalitis, infectious, case rates	Influenza		Measles case rates	Meningitis, meningococcus, case rates	Pneumonia death rates	Poliomyelitis case rates	Scarlet fever case rates	Smallpox case rates	Typhoid and paratyphoid fever case rates	Whooping cough case rates
			Case rates	Death rates								
New England	7.8	2.6	0.0	0.0	698	34.0	44.4	0.0	303	0.0	2.6	91
Middle Atlantic	3.2	0.5	3.2	1.4	259	19.4	42 6	2.3	127	0.0	3.2	33
East North Central	9.2	0.0	0.6	1.2	526	19.6	27.0	1.2	161	0.0	1.2	72
West North Central	2.0	0.0	0.0	2.0	688	25 9	45.8	0.0	159	0.0	2.0	24
South Atlantic	13.1	0.0	6.5	3.3	397	8.2	44.1	0.0	126	0.0	3 3	101
East South Central	0.0	0.0	0.0	11.8	148	5.9	47.2	5.9	41	0.0	5.9	30
West South Central	5.7	0.0	17.2	8.6	63	5.7	51.7	8.6	23	0.0	2.9	40
Mountain	31.8	0.0	0.0	0.0	612	15.9	95 3	0.0	365	0.0	0.0	119
Pacific	11.1	0.0	6 3	1.6	990	19.0	33.2	0.0	210	9.0	0.0	24
Total	7.2	0.3	3.4	2.1	461	18.6	39.9	1.7	153	0.0	2.3	53

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—Week ended May 27, 1944.—During the week ended May 27, 1944, cases of certain communicable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox		38		153	266	30	19	71	151	728
Diphtheria		8	6	20	1	6	1			42
Dysentery (bacillary)				14					1	15
German measles		18		162	77	9	34	14	50	364
Influenza					10				2	12
Measles	2	56	4	732	685	237	82	94	38	1,930
Meningitis, meningococcus					2					2
Mumps		9		196	150	27	9	72	25	488
Poliomyelitis					1	1				2
Scarlet fever		18	12	87	195	51	8	77	74	522
Tuberculosis (all forms)	1	5	5	174	36	18	17		64	320
Typhoid and paratyphoid fever			2	5	1			2	1	11
Undulant fever					1	1				2
Whooping cough		31		41	38	1	5	11	39	166

JAMAICA

Notifiable diseases—4 weeks ended June 3, 1944.—During the 4 weeks ended June 3, 1944, cases of certain notifiable diseases were reported in Kingston, Jamaica, and in the island outside of Kingston, as follows:

Disease	Kingston	Other localities	Disease	Kingston	Other localities
Chickenpox	20	60	Leprosy		5
Diphtheria	2	2	Tuberculosis	37	62
Dysentery	2	1	Typhoid fever	13	43
Erysipelas	1	2	Typhus fever	13	3

SWEDEN

Notifiable diseases—March 1944.—During the month of March 1944, cases of certain notifiable diseases were reported in Sweden as follows:

Disease	Cases	Disease	Cases
Cerebrospinal meningitis	8	Poliomyelitis	35
Diphtheria	281	Scarlet fever	3,071
Carriers	222	Syphilis	99
Dysentery	111	Typhoid fever	2
Gonorrhea	1,567	Undulant fever	3
Hepatitis, epidemic	694	Weil's disease	13
Paratyphoid fever	14		

WORLD DISTRIBUTION OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER

From medical officers of the Public Health Service, American consuls, International Office of Public Health, Pan American Sanitary Bureau, health section of the League of Nations, and other sources. The reports contained in the following tables must not be considered as complete or final as regards either the list of countries included or the figures for the particular countries for which reports are given.

CHOLERA

[C indicates cases]

NOTE.—Since many of the figures in the following tables are from weekly reports, the accumulated totals are for approximate dates.

Place		January-March 1944	April 1944	May 1944—week ended— 6	13	20	27
ASIA							
Ceylon	C	2					
India	C	42,788	10,599				
Calcutta	C	725	681	274	138	155	89
Chittagong	C	63					
Madras	C	36					
Negapatam	C	17					

PLAGUE

[C indicates cases; D, deaths; P, present]

Place		January-March 1944	April 1944	May 1944—week ended— 6	13	20	27
AFRICA							
Belgian Congo	C	3					
Plague-infected rats		P					
British East Africa:							
Kenya	C	1					
Uganda	C	8	1				
Egypt	C	134	117	44	44	51	40
Port Said	C	1	6	1	2		3
Suez	C	117	23	3	3	2	3
French West Africa: Dakar	C		7	1	1		
Madagascar	C	60					
Morocco (French)	C	20	2				
Rhodesia, northern	C	1					
Union of South Africa	C	23					
ASIA							
China: Foochow	C	P					
India	C	4,811	1,621				
Indochina	C	17	13		6		
Palestine	C	1					
SOUTH AMERICA							
Bolivia: Chuquisaca Department	C	4					
Ecuador: Chimborazo Department	C	1					
Peru:							
Libertad Department	C	5					
Lima Department	C	16					
OCEANIA							
Hawaii Territory:							
Hamakua District	D	[1] 4					
Plague-infected rats [2]		[3] 33	[4] 8				

[1] Includes 1 death from pneumonic plague.
[2] 53 fleas were also proved positive for plague on March 7, 1944.
[3] Includes 11 plague-infected mice.
[4] Includes 1 plague-infected mouse.

SMALLPOX

[C indicates cases; P, present]

Place		January-March 1944	April 1944	May 1944—week ended— 6	13	20	27
AFRICA							
Algeria	C	364	90				[1] 141
Angola	C	20					
Basutoland	C	31					
Bechuanaland	C	7					
Belgian Congo	C	747	171	8	29		
British East Africa:							
Kenya	C	1,834	358	69	82	35	
Mombasa	C	95	31	1	3	1	4
Tanganyika	C	427	306	29	43	48	
Uganda	C	900	613	150	88	123	
Cameroon (French)	C	190	143				
Dahomey	C	20	24				
Egypt	C	4,768	1,236			382	
French Equatorial Africa	C	418					
French Guinea	C	198	171				
French West Africa: Dakar	C		4				
Gambia	C	13					
Gold Coast	C	5					
Ivory Coast	C	255	84				
Morocco (French)	C	522	54				
Mozambique	C	1					
Nigeria	C	1,648	443	174	99	89	
Niger Territory	C	391	65				
Senegal	C	59	26				
Sudan (French)	C	1,167	533				
Tunisia	C	5					
Union of South Africa	C	29	1	4	1		
ASIA							
Arabia	C	[2] 7	2				
Ceylon	C	7	1				
China: Kunming [3]	C	7	18	7	1	1	6
India	C	102,820	43,302				
Indochina	C	990	275				
Iran	C	1					
Iraq	C	22	1				
Palestine	C	4	51	10		10	10
Syria and Lebanon	C	122	43		2		
EUROPE							
Gibraltar	C	P					
Great Britain:							
Birkenhead	C				1		
London	C	[4] 12					
Greece: Hevros Department	C	209					
Portugal	C	9	4			1	
Spain	C	42	72		5		
Turkey	C	5,016					
NORTH AMERICA							
Guatemala	C		1				
Honduras	C	6					
Mexico	C	908					
SOUTH AMERICA							
Bolivia	C	85	77				
Brazil	C	6	19		7	10	11
Colombia	C	110	88				
Ecuador	C	4					
Peru:	C	47					
Lima	C	19					
Venezuela	C	48	29				

[1] For the month of May 1944.
[2] Includes 4 imported cases.
[3] Yunnan Fu.
[4] Includes 1 case imported from the Middle East.

TYPHUS FEVER

[C indicates cases]

Place		January-March 1944	April 1944	May 1944—week ended— 6	13	20	27
AFRICA							
Algeria	C	303	188				[1] 234
Basutoland	C	4					
Belgian Congo	C	5	1				
British East Africa: Kenya	C	4	1	2			
Egypt	C	5,302	3,313			800	
French West Africa: Dakar	C	6			3		
Morocco (French)	C	751	409				
Morocco (Spanish)	C	5					
Mozambique	C	2					
Nigeria	C	1	1				
Rhodesia, northern	C	6	11				
Tunisia	C	238	126			[2] 125	
Union of South Africa	C	2,901	203	73	91	23	27
ASIA							
Arabia: Western Aden Protectorate	C	[3] 15					
China: Kunming [4]	C	4	20	2	3		10
India	C	3					
Iran	C	3,185	1,360	423	330	288	161
Iraq	C	133	161	57	59		
Palestine	C	201	76	20	3	18	32
Syria and Lebanon	C	129	222	5	13		
Trans-Jordan	C	24					
EUROPE							
Belgium	C			1			
Bulgaria	C	455					
France	C	3		1			
Greece	C	48					
Hungary	C	765	817	166	158	153	172
Irish Free State	C		1			1	1
Netherlands	C	7					
Portugal	C						
Rumania	C	5,058					
Slovakia	C	204	34		[5] 43		
Spain	C	125	167	33			
Turkey	C	1,095					
Yugoslavia	C	1,738					
NORTH AMERICA [6]							
Guatemala	C	597	399				
Jamaica	C	1	11	2	1	6	5
Mexico	C	614					
Panama Canal Zone	C	1					
Puerto Rico (endemic)	C	17	16	2	1	12	6
Salvador	C	2	1				
Virgin Islands	C	1					
SOUTH AMERICA							
Bolivia	C	21	18				
Chile	C	100	34				
Curacao	C	1					
Ecuador	C	101					
Peru	C	1					
Venezuela	C	18	10				
OCEANIA							
Australia	C	49	25	3	1		
Hawaii Territory	C	22	4		1	1	

[1] For the month of May 1944.
[2] For the period May 1-20, 1944.
[3] A report dated Mar. 30, 1944, states that an estimated 800 deaths from typhus fever have occurred.
[4] Yunnan Fu.
[5] For 3 weeks.
[6] Cases of typhus fever listed in this area are probably of endemic type.

YELLOW FEVER

[C indicates cases; D, deaths]

Place		January–March 1944	April 1944	May 1944—week ended—			
				6	13	20	27
AFRICA							
Belgian Congo:							
Babeyru	D	1					
Bondo.[1]							
Leopoldville	C	1					
Gold Coast: Tamale	C	[2] 1					
EUROPE							
Portugal: Lisbon.[3]							
SOUTH AMERICA							
Brazil:							
Acre Territory	D	1					
Matto Grosso State	D	3					
Colombia:							
Boyaca Department	D	1					
Caldas Department	D	1					
Santander Department	D	2					

[1] For the week ended June 3, 1944, 1 death from yellow fever was reported in Bondo, Stanleyville Province, Belgian Congo.
[2] Suspected.
[3] According to information dated Jan. 21, 1944, it is reported that a vessel which called at the islands of Sao Tome and Cape Verde arrived at Lisbon, Portugal, with cases of yellow fever on board.

×

FEDERAL SECURITY AGENCY

UNITED STATES PUBLIC HEALTH SERVICE

THOMAS PARRAN, *Surgeon General*

DIVISION OF PUBLIC HEALTH METHODS

G. ST. J. PERROTT, *Chief of Division*

The PUBLIC HEALTH REPORTS, first published in 1878 under authority of an act of Congress of April 29 of that year, is issued weekly by the United States Public Health Service through the Division of Public Health Methods, pursuant to the following authority of law: United States Code, title 42, sections 7, 30, 93; title 44, section 220.

It contains (1) current information regarding the prevalence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease, (3) other pertinent information regarding sanitation and the conservation of the public health

The PUBLIC HEALTH REPORTS is published primarily for distribution, in accordance with the law, to health officers, members of boards or departments of health, and other persons directly or indirectly engaged in public health work. Articles of special interest are issued as reprints or as supplements, in which forms they are made available for more economical and general distribution.

Requests for and communications regarding the PUBLIC HEALTH REPORTS, reprints, or supplements should be addressed to the Surgeon General, United States Public Health Service, Washington 14, D. C. Subscribers should remit direct to the Superintendent of Documents, Washington 25, D. C.

Librarians and others should preserve their copies for binding, as the Public Health Service is unable to supply the general demand for bound copies. Indexes will be supplied upon request.

UNITED STATES GOVERNMENT PRINTING OFFICE, WASHINGTON . 1944

For sale by the Superintendent of Documents, Washington 25, D .C

Price 5 cents. Subscription price $2.50 a year